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Midwest Engineer

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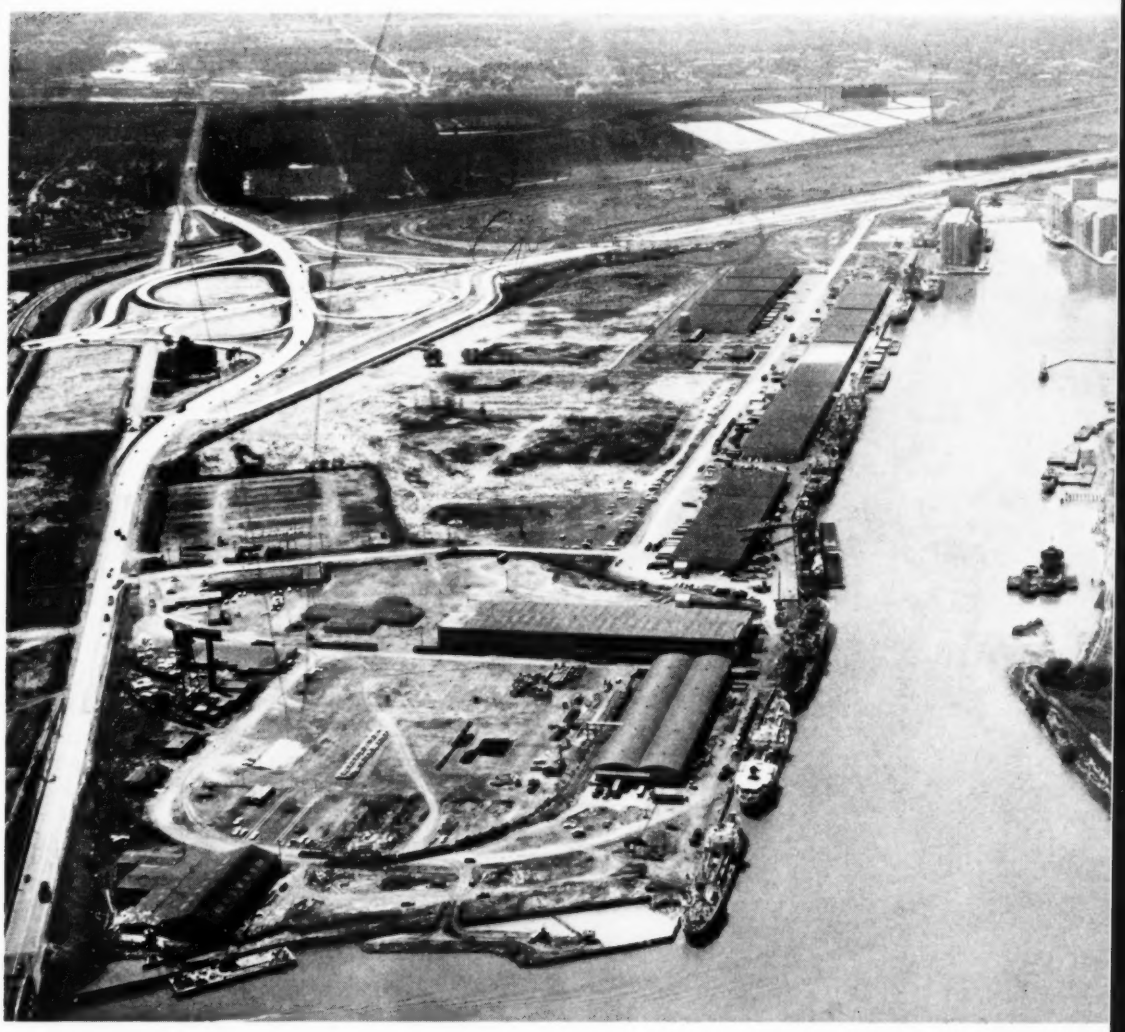
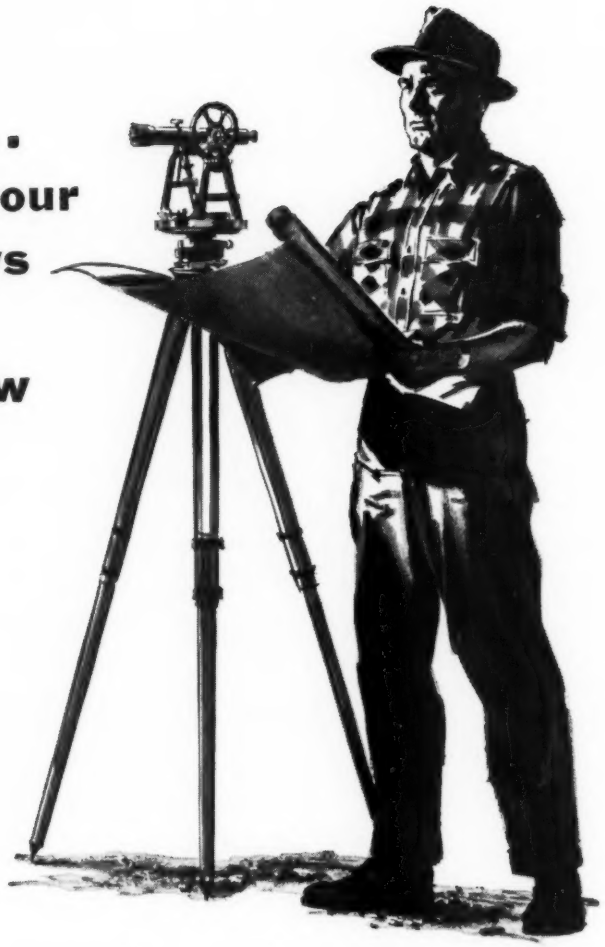


WESTERN SOCIETY OF ENGINEERS FOUNDED 1869

FUNCTION OF ADDITIVES IN PETROLEUM PRODUCTS — PAGE FIVE

Vol. 12 NOVEMBER, 1959 No. 4

Today... he plans your highways of tomorrow



Today he looks across an expanse of rolling hills and open fields . . . and sees the majestic ribbons of concrete that will, surprisingly soon, be serving your community and state. Tomorrow he addresses a chamber of commerce group, later meets with commissioners to discuss land acquisition for a new freeway. For his duties are multifold . . . he is your Highway Engineer.

Planner, builder, administrator. He is all of these, making decisions on highway problems that may affect your welfare and prosperity for generations. Many of these decisions he must make alone, unbiased, in the best interests of all the people. He is a man of integrity, entrusted with the mobility of millions of people. He deserves your enthusiastic support and cooperation.

PORTLAND CEMENT ASSOCIATION
111 West Washington Street, Chicago 2, Ill.

FOR HIGHWAYS WITH A SOLID FUTURE.
Concrete

A national organization to improve and extend the uses of concrete

Midwest Engineer

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November, 1959 Vol. 12, No. 4

CONTENTS

COVER STORY

This issue we see an aerial view of the Chicago Regional Port District's busy Port of Chicago. The direction we are looking is west. Calumet Expressway runs diagonally across the landscape back of the huge grain elevators, and connects, via the cloverleaf, with 130th street at the left. Along the channel leading from Lake Calumet to the Calumet River in the foreground are the ships of several countries. Leaving the river, these ships enter Lake Michigan, an important link in the St. Lawrence Seaway, and may make for any other seaport in the world.
—Courtesy of Calumet Studio

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Top, Fred Prince and Lauren R. Asplund relax at the Speaker's Table. Asplund spoke on "Membership" a while later.

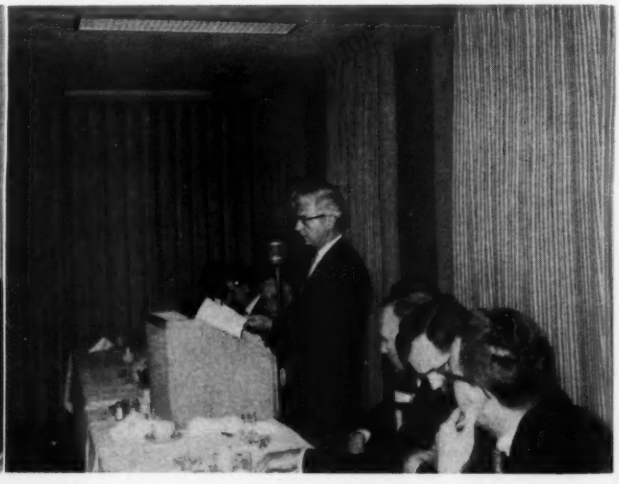
Above, listeners applaud the words of a Dining Room speaker.

Below, some of those sitting at the Speaker's Table.

Top, Citation Award recipient Wayne A. Johnson, of the Illinois Central, and R. D. Maxson, WSE V.P., pause over coffee.

Above, Dr. Rettaliata accepts Mr. Johnson's memento.

Below, program chairman Heckendorn adjourns dinner meeting.



The General Meeting of September 29

The critical game between the Dodgers and the Milwaukee Braves was in full swing! Feeling was at fever pitch as announcements poured forth from the P. A. system. It almost seemed that nothing was ever going to break the tie. Finally Fred Bruce broke it—the tie, that is, between the TV set and the eyes and ears of fascinated WSE members. Mr. Bruce, WSE executive secretary, again announced that diner was served in the dining room. He added that progress of the game would be given over the speaker system.

With that, the WSE members and their guests filed from the lounge and went on to the 5th floor Dining Room, while the Dodgers went on to win the National League pennant.

What was the occasion? Well, the date was September 29, 1959. The place, the Western Society Headquarters. It was the first WSE General Meeting of the 1959-60 year.

In the Dining Room the WSE members and their guests ate a solid and appetizing prime rib of beef dinner, complete with salad, coffee, and desert.

Coffee cups were filled again as the non-technical portion of the meeting began.

After various introductions and announcements, Dr. John T. Rettaliata, WSE president, took the floor to introduce Mr. Wayne A. Johnson. Mr. Johnson, president of the Illinois Central System, was to be awarded a citation by the Western Society for his numerous and outstanding contributions to the transportation industry in particular, and to humanity in general.

Mr. Johnson's Response

After receiving the citation from Dr. Rettaliata, Mr. Johnson responded as follows:

"Thank you, Dr. Rettaliata. I am most pleased to receive this citation. I am sure there are more worthy recipients, but I would be less than honest if I did not admit I am greatly flattered. Your own society might very well have presented its citation to you, for as much as any man in Chicago you exemplify the good citizen. You are still a young man, yet you already have come a long way and have grown tall in civic stature.

"This is a thrilling time to be living in Chicago, and a great time to be an engineer. A few decades ago there was a sad period when engineers wondered if they were still needed. Now we know the great era of engineering is not behind us, but ahead of us. Chicago is moving as never before. The teamwork between government and business and civic and professional organizations is more conducive to progress than at any other time in my memory. As our problems with our growing size have become larger and more difficult, it seems to me our leaders have also grown in character. I mention Leverett Lyon and Edward Eagle Brown as two giants who have passed away recently as the kind of men who have proved once again a city is great only as the men who guide its affairs are great.

"In some ways, this city of ours was asleep. Now it is stirring with new vigor. Great plans are being made, and great plans are being accomplished. At the vanguard of these plans, esstential to their success, are the engineers.

"I think all of you know the railroads and Chicago grew up together. The railway era was just beginning when Chicago was young. The web of steel rails that increasingly spread out from Chicago made this city the transportation center of the whole North American continent. As I stand in my office at Central Station and look out at Grant Park, I often think of how much Chicago and the railroads have meant to one another. Newer modes of transportation have come into being since then, and each is important in its own way, but Chicago still needs its strong railroads to continue its great progress.

"The Illinois Central and the Western Society of Engineers have a rather special relationship that goes back many years, and it is this: One of the founding members of your Society was also the man who completed the building of the charter lines of the Illinois Central Railroad. He was Roswell B. Mason, one of the great railway engineers of his time. As chief engineer of the Illinois Central, the first major railroad in this part of the country, Mason needed all the skill and courage of his being to overcome the enormous difficulties he faced. Labor shortages, supply difficulties, continuous needs for funds and, even more, death and terror caused by cholera and malaria, all these and other obstacles stood in his way, yet he completed the original Illinois Central several months ahead of schedule. At its completion, it was the longest railroad in the world.

Illustrious WSE Member

"This illustrious member of your Society established his home in Chicago

and became just such a leader as we have been talking about. He was the builder of the first street railways. He was mayor of Chicago during the great fire of 1871, one of the most terrible catastrophes in American history. Up from the ashes, he helped to rebuild the city which today we see still growing, still improving.

"A few years ago, when we celebrated the centennial of the completion of the charter lines of the Illinois Central by erecting a memorial to Roswell B. Mason in the community named in his honor, Mason, Ill., we presented a souvenir of that occasion to the members of the Mason family. I thought you might like to have such a souvenir for your archives, and hereby present one to your president."

With this, Mr. Johnson handed the souvenir in its neatly bound green-leather cover to Dr. Rettaliata, and sat down.

Maxson Speaks

Mr. Raymond D. Maxson, first vice-president of the Western Society, and consulting senior engineer at Commonwealth Edison Company, and consultant to Sargent & Lundy, subsequently gave his interesting talk on "The Engineer and the Western Society." Mr. Maxson was the main dinner speaker.

He started with the statement that his words had a two-fold purpose:

"First," he said, "directed to those of you who are already members of the Society, to point out how you can obtain more from your membership.

"Second," he continued, "directed to those of you who are not as yet members of the Society, to invite and solicit your membership in this society in order that you may enjoy to the fullest, its membership privileges.

"I will start this discussion by posing two pertinent questions and then try to answer them in sufficient detail so as to cover the objectives just given. The questions are:

1. What is the Western Society of Engineers? and,
2. Why should I belong to the Western Society of Engineers?

"Because of the close inter-relationship of these questions, any discussion of one will involve the other in much the same fashion as the "chicken and egg" or is it the "egg and chicken," that classical, but non-engineering, dissertation piece.

He continued, saying that the Western Society of Engineers is a group of some 2,500 engineers, each in general, trained in a specific engineering discipline. But each individual member of the Society recognizes the value and opportunity, offered by the Society, Mr. Maxson said, of associating with engineers of other disciplines. This allows the engineer, first, to broaden his engineering background by being exposed to the engineering projects and problems of other engineers through technical meetings and discussions. Secondly, and of equal importance, this allows the engineer to broaden his social capacity through contact with the membership at gatherings sponsored by the Society, "such as at this meeting tonight."

Mr. Maxson continued, sketching the Western Society's broad objectives, its formation, organization, activities, and its facilities.

You Should Belong

He closed with the thoughts:

"You should belong to the Western Society because:

—You want to broaden your knowledge in fields of engineering other than your own.

—You want to broaden your social contacts among engineers.

—You want to meet and know engineers who are getting ahead in the world.

—You want to become better acquainted with your fellow engineers by serving on committees and help run the Society.

—You want to take advantage of the Club-like facilities provided here at the Headquarters.

—And finally, you want to be recognized as an engineer of broad stature by your fellow engineers.

"All of these 'wants' can be satisfied through a membership in Western Society of Engineers. I urge present members to obtain more from your membership by increased participation in the Society's activities. I urge prospective members to make immediate application for membership, so they too can enjoy to the fullest, membership benefits and privileges," he concluded.

Lauren R. Asplundh, chairman of the Membership Committee and an engineer with the Illinois Bell Telephone Company, then spoke briefly on plans for increasing membership during the current fiscal year.

The 1959-60 program chairman, Mr. Harold R. Heckendorn, then adjourned the dinner meeting to the two simultaneous technical sessions on the 7th floor.

Technical Session No. 1

One technical session was under the sponsorship of the newly-formed Education and Research Division. Howard A. Carter is chairman of this group. The speaker was Mr. Johan Graae, senior mechanical engineer, Argonne National Laboratories, Lemont, Ill. He spoke on "Mechanical Problems in Processing Reactor Fuel."

Mr. Graae discussed, with the aid of slides, the handling of highly reactive fuel in an integrated reactor fuel processing plant.

Technical Session No. 2

The other technical session on September 29 consisted of a panel talk on "Gas Fired Infra-red Generators and Their Applications." The basis for the discussion was the following information:

Gas fired radiant heaters have been used for many years both for heating small rooms and for cetrain industrial processes. Possibilities for application of this method of generating and transferring heat have been vastly increased by the adoption in the United States of a type of burner developed in Europe, making practical use of infra-red to heat high-bay buildings as well as for industrial processes, and many other applications where convection heating equipment is not satisfactory or is expensive to operate.

Gas fired radiant burners designed by Gunther Schwank of Cologne, Germany, have been used abroad for some years to heat places such as cathedrals, gymnasiums, exhibit halls, arcades, patios, outdoor cafes, and factories. A few years ago, the Perfection Industries Division of Hupp Corporation acquired the rights to manufacture this patented burner in America. It has adapted the burners to handle natural, mixed, and LP-gases, and redesigned the heaters to meet the requirements of the AGA and Underwriters Laboratories.

The panelists were Messrs. D. W. Milestone, general sales manager of the Infra-Red Division of Perfection Industries, a division of Hupp Corporation, Cleveland, Ohio; Fred Prince, manager of Sales Engineering; and Fred A. Perkins, president of Infra-Red Heating Company, Chicago.

The Gas, Fuels, and Combustion Section, W. H. Gehl, Jr., chairman, was sponsor.

FUNCTION OF ADDITIVES IN PETROLEUM PRODUCTS

By Dr. Austin B. Wilder, MWSE

This year represents the 100th anniversary of the Petroleum Industry. It was in 1859 that Colonel Drake dug the first oil well at Titusville, Pennsylvania.

The great impetus for petroleum products has occurred during the past 50 years or since the advent of the automobile. During this period refineries and processors have been seeking better ways to improve their products. The purpose of our discussion is to review the function of various additives now available for gasolines, distillates and lubricants.

Gasolines

Since the discovery of tetraethyl lead in the early 20's as an anti-knock compound in motor and aviation gasolines, manufacturers of these products have incorporated this material in these finished products. Until recently the maximum dosage of tetraethyl lead in motor fuels was 3.0 ml. per gallon for motor gasoline and 4.6 ml. per gallon for aviation gasoline. Recently the maximum dosage of tetraethyl lead in motor gasoline was increased to 4.0 ml. per gallon.

Both motor and aviation gasolines containing tetraethyl lead must also contain an appropriate dye. The dye concentration in these fuels must meet a minimum color standard. The purpose of the dye is to identify the fuel as containing tetraethyl lead and prevent its use as a dry-cleaning agent or possibly in other applications and, in the case of aviation gasolines, to identify the various grades.

Originally, the barrel of crude contained only about 18 per cent gasoline. By employing expensive equipment, refiners are now able to obtain more than 50 per cent of the barrel of crude as motor gasoline. These processes include re-running, cracking, reforming and alkylation. Both motor and aviation gasolines contain an antioxidant to prevent gum formation. The normal dosage of antioxidants in gasolines ranges from 4 to 10 pounds per 1000 barrels. It has also been found that metal deactivators normally added in concentrations of approximately 2 pounds per 1000 barrels are effective in controlling the stability of the final product. Metal deactivators form chelates with the traces of metallic copper present in most motor and aviation gasolines, thus deactivating the catalytic effect of copper to give a more stable product.

A number of years ago it was found that automobiles have a tendency to stall from ice formation on the throttle plate during the warming-up period in the intermediate atmospheric temperatures ranging from freezing to about 50°F. Additives have been found useful in preventing this type of stalling. In general, there are two types of additives employed for this purpose—surfactants and freezing point depressors. Surfactants, employed in small concentrations, also prevent or reduce gum formation in in-

—Drake Well Museum

The world's first commercial oil well as seen in an old photograph of 1861, taken near Titusville, Pa. Colonel Edwin L. Drake is the man in the frock coat and top hat.

take manifold and carburetors. Freezing point depressors, in addition to preventing ice formation on the throttle plate, also decrease the tendency for fuel line freeze-ups. Some gasolines also contain an anti-rust agent to prevent rusting of the fuel tank.

Distillate Fuels

The distillates referred to in this discussion include burning oils, diesel fuels and jet fuels. Additives in distillate fuels improve these products with reference to color stability, sludge or gum stability, filterability of the aged fuel, rust prevention and combustion quality.

The additives normally employed in burning oils are non-metallic polar polymers, amines, metal petroleum sulfonates, and similar materials. These additives act as stabilizers and prevent or reduce the tendency of the product to form gum. Some additives also are dispersants and keep gum dispersed in the form of small particles so the product will flow freely through filters without blockage.

The large volume users of diesel fuels are the railroads, trucks and buses and stationary units employed by utility companies. Some of the important properties of diesel fuels are cetane number, sulfur, volatility (distillation range), viscosity, carbon residue, gravity, pour and cloud point, and stability. The cetane number of diesel fuels does not seem to occupy the important specification today that it did a few years past. This is because diesel engines do not seem to require as high a cetane number fuel as it was once thought they did. Amyl nitrate is sometimes employed in increasing the cetane number of certain fuels depending upon the end use and other requirements.

According to the Bureau of Mines Survey diesel fuels may be grouped into four classes. These classes are as follows:

1. Diesel fuel oils for city-bus and similar operations
2. Fuels for diesel engines in trucks, tractors and similar service
3. Fuel for railroad diesel engines
4. Heavy-distillate and residual fuels for large stationary and marine diesel engines

Since refiners in some cases market diesel fuels for certain end uses which are similar to or identical with a No. 2 burning oil, the additives employed in this grade of burning oil may also be employed in diesel fuels. These additives include the dispersant type of additive in order to eliminate or minimize the tendency of the fuel to clog filters and increase the fuel stability. Metal deactivators are also employed in a number of diesel fuels in order to eliminate or minimize the catalytic effect of metals in these fuels.

Recently the railroads representing a large user of diesel fuels (approximately 2½ billion gallons per year) leaned toward "economy fuels." These fuels normally contain a high percentage of cracked material. Their tendency to gum and plug filters is increased. It is necessary to overcome these difficulties by the use of additives.

It has been estimated that the use of jet fuels by the military is about six times that used by commercial companies, or 230,000 barrels (42 gallons) per day by the military and 40,000 barrels per day by commercial companies. In 1965 it is estimated that the military will use only about 1½ times that used by commercial companies, or 300,000 barrels per day by the military and 220,000 barrels per day by commercial companies. The stability of jet fuels is an important factor. It is also important that fuels burn with a minimum amount of radiation from the flame and thus reduce damage to the combustion chambers of jet engines. The fuel also must burn a minimum of smoke.

Recently oil companies and engine manufacturers have developed a new test for jet fuels called the Luminometer Number. This method of tests was developed to assist in the control of the radiation of the flame and the smoking tendencies of the fuel when burned. The higher the Luminometer Number, the better the fuel in this regard. The additives employed in both military and commercial jet fuels include antioxidants to increase stability and metal deactivators to deactivate the catalytic effect of metals in the fuel.

Lubricants

The use of additives in lubricants is a multi-million dollar business. A variety of additives are employed to improve the properties of today's lubricants.

When we think of lubricants and lubrication engineering, we think of the American Society of Lubrication Engineers, a national organization located here in Chicago. This Society is fifteen years old this year and is devoting its activities to lubrication problems.

In discussing the function of additives in lubricants, we are considering:

1. Crankcase Oils
2. Gear Oils
3. Synthetic Lubricants
4. Metalworking Lubricants
5. Transmission Fluids
6. Hydraulic Oils
7. Miscellaneous Lubricants

The use of additives in lubricating oils is not new. In fact, their use dates back to 1872 and possibly earlier. The big push for additives, however, has occurred during the past twenty years. This increased demand for these materials was brought about by a combination of several factors. In the first place, the development of new engines having more power per cubic inch displacement demanded more and more of the oil to provide satisfactory lubrication. These engines impose conditions whereby the oil must not only lubricate, but it must also cool, cleanse and protect the working parts, and it must do this over extended periods of time. The second reason for this increased demand for additives appears to be the highly competitive spirit prevailing in the petroleum industry. This means that everyone is not only striving to meet all the requirements of a good lubricant, but also trying to exceed these requirements and make available outstanding products.

The development of the finest oils found anywhere for lubricating the modern internal combustion engine has been a gradual one. This development has been along two lines. First, there has been an improvement in the selection and refining processes for manufacturing the base oils, and secondly, these oils are being reinforced with suitable amounts of additives to achieve the desired finished product.

Depending upon the types of service requirements, there is available the following types of crankcase oils:

1. Regular (ML)
2. Premium (MM) (MS)
3. Multigrade (MM) (MS)
4. Heavy Duty (MS) (DG)
5. Diesel (DG) (DS)
6. Supplement #1 (DG)
7. Supplement #2 (DG)

Letters in parenthesis refer to API's classification of these crankcase lubricants indicating the type of service involved.

Up until 1926 lubricating oils were classified as light, extra light, medium, medium heavy, and so on. At that time the Society of Automotive Engineers developed a classification which was some help in standardizing the various grades of lubricating oil on the basis of their viscosity. This SAE classification number with reference to viscosity range is as follows: 5, 10, 20, 30, 40, 50, 60 and 70. SAE 5 represents the lightest oil in connection with viscosity and SAE 70 represents the heaviest oil. For winter operation, particularly in the northern climates, refineries and oil compounders have modified three of these SAE grades and call them 5W, 10W and 20W.

After a base oil has been selected and refined, it is ready to be further compounded with additives. The classes of additives available for the finished commercial oils are:

1. Antioxidants and Bearing Corrosion Inhibitors
2. Detergent-Dispersants
3. Extreme Pressure Agents
4. Rust or Corrosion Inhibitors
5. Viscosity Index Improvers
6. Four Point Depressants
7. Anti-Foam Agents
8. Film Strength Agents
9. Oiliness Agents
10. Anti-Wear Additives

From this list of available additives for lubricating oils, it appears that the importance of the oil may have become secondary and its principal purpose may be to serve as a carrier for the additives and as a coolant. This situation is not true. Although additives in lubricating oils oftentimes vary from 4 to approximately 20 weight per cent, it has been demonstrated many times that additives alone are not a substitute for high quality oil. At the same time, the base oil alone, regardless of its quality, cannot satisfy the severe requirements imposed on it during the operation of today's engines.

One class of additives listed above may serve a dual purpose in lubricating oils. For example, a detergent-dispersant type additive may perform in an excellent manner in this capacity, yet it may also have excellent viscosity index improving properties.

In addition to the functional properties of these additives, another important function of certain additives in crankcase oils is the effect they have on the performance of filters. The particular type of detergent present in the lubricating oil has a marked effect on the length of time required for the crankcase oil filter element to build up sludge deposits. An extension of the filter life can be achieved by the use of detergents which slow the rate of sludge accumulation on the filter. The advantages of decreasing the rate of sludge build-up on the filter are apparent; they are (1) extended life between filter changes, (2) decreased chance of filter failure between scheduled inspections and (3) increased opportunity for the filter to remove abrasive materials before they can contribute to engine wear.

The proper application of lubricants and the use of additives in them is a function of the Lubrication Engineer. His profession is a highly specialized one, requiring expert knowledge of lubricants, engineering principles and machine tools.

SLIPPERY SEALS

Howard J. DePree, who wrote this article, is a member of the Ethics and Practices Committee of the Chicago Chapter of the Illinois Society of Professional Engineers.

Whenever I talk or write about the problem of seals, I confess a sense of embarrassment. This stems from the fact that unlike most engineering topics, discussions of engineering seals have to be conducted on a kindergarten level. Since the art of applying seals is only crudely developed, I must talk about the most elementary matters to a sophisticated audience that is expecting me to be profound.

One reason for the difficulty in teaching engineers how to seal is that it looks easy. If there is one thing upon which almost everyone prides himself, it is his ability to use the tools of his profession or trade. This is especially true of engineers. Not only do they underestimate the difficulties of sealing, but they tend to think of themselves as individually accomplished. It is difficult to sell a man a new suit when he considers himself already well accoutered.

This poses a dilemma. If I am to make this subject clear to you, I must oversimplify it to the point of confirming your natural prejudices. On the other hand, if I am to paint a true impression, I must frighten or confuse you with a bewildering mass of principles, approaches, and details. I will do my best to take a middle course.

Do You Own a Seal?

First of all, do you own a seal? If your answer is an emphatic yes, give yourself an "E" for being prepared. However, if you unfortunately have spent your earnings on mink, get prepared to throw at least a fin toward the purchase of your new seal. Section 13 of the Illinois Professional Engineering Act provides in part as follows:

> "Each registrant shall, upon registration, obtain a seal of the design authorized by the Department bearing the registrant's name and the legend, 'Registered Professional Engineer of Illinois'."

It ought to go without saying that the legislative message is loud and clear. To go even farther, Section 28 of the Act announces that a violation of any of the provisions of the Act is punishable by a fine of not less than $100.00, nor more than $500.00, or imprisonment in the county jail for a period of not exceeding three months, or both.

We come now to the basic steps in putting this seal to work. The first step is to explore the existing legal situation. Section 13 of the Act relates the following:

> ". . . Plans and specifications rendered as professional engineering services by a Registered Professional Engineer shall be stamped with such seal, during the life of the registrant's certificate, . . ."

Over the years, the professional engineers have built up an immunity to this section of the Act. Some of us justify our actions with the thought that George doesn't stamp his drawings, so why should I. Others plead unfamiliarity with the sealing requirement. Some console themselves with the thought that their client's work was so elusive that it was impossible for him to do a perfect job, and that if their seal is not placed on the work, no discredit can be placed on them. Deception is good football; it is very poor engineering. I ask you, each of you, if any of the foregoing excuses lend dignity and honor to the Engineering Profession.

Most engineers fail to realize that increasing numbers of non-engineers are preparing plans and specifications. Proving liability for negligence based on such plans and specifications should be uncomplicated and assured. In practice, however, this is not the case because a standard for sealing is not practiced by professional engineers.

The second step is to apply the substance of the legal message. Here are some of the rules for application of seals that may assist you and make the task completely understandable. Taken by itself, one of these rules doesn't amount to much. Certainly a single application of one of them will have only a slight effect. How much does a grain of sand weigh? Very little. But a sand pile can be heavy. Similarly, these rules are valuable for their cumulative effect; and their cumulative effect, I assure you, can be considerable.

Good Rules

The cardinal rule of all sealing can be stated in four words: *Use your seal consistently*. That is, don't limit the use of your seal only to situations in which the client or municipal body requires it.

Another good rule is: Keep your seal

Second

WEST SUBURBAN MEETING

Watch your Mail
for an announcement
of the Program

When: December 9, 1959

Where: Remick's Lilac Lodge
Wolf Road and 22nd Street
Hillside

Time: Dinner — 6:30 PM
Meeting — 7:30 PM

in your own possession. Do this so that no attempt can be made by another to use it.

The third thing to remember is that your seal is to be affixed only to work which has been done by you, or under your personal supervision.

Fourthly, keep your seal up to date by keeping your registration up to date. It is unlawful for anyone to stamp or seal any documents after his registration certificate has expired or has been suspended or revoked.

For a fifth rule, establish the habit of placing your seal on the original plan or specification immediately after its completion and before changes have been made on it. Affix your seal to prints of original drawings only after verifying the changes or revisions. In addition, require change numbers for all revisions.

Also, consider the fundamental matter of taking the trouble to educate yourself on what is involved in turning out a professionally adequate product according to the Canons of Ethics for Engineers. Place your mark only on such work that complies with the Canons.

I'm assuming at this point that you have thought out some additional rules. If you have, you will appreciate the difficulty of putting these ideas into words and the contingencies that must be considered.

In closing I would like to say that conscientious effort to make proper use of your seal pays rich rewards. The deep satisfaction that comes from wrestling with man-sized problems and producing solutions to them should be evidenced by your imprint on the work. Take a firm grip on your seal. Don't let it slip out of your grasp.

Ground Breaking Ceremonies

Ground breaking ceremonies for the United Engineering Center, a multi-million dollar, eighteen story structure to be erected opposite the United Nations in New York City, were held Thursday, October 1, 1959, at 11:00 a.m. Former President Herbert Hoover, Honorary Member of WSE, representing the older generation of engineers shared earth-turning honors with a freshman engineering student from Hawaii, Jerry Fujimoto, representing engineers of the future.

To occupy the block between 47th and 48th Streets, on United Nations Plaza (First Avenue), the Center will house the headquarters of eighteen major engineering societies with a combined membership of more than 300,000.

Mr. Fujimoto, an American citizen of Japanese extraction, enrolled this fall at Rensselaer Polytechnic Institute, Troy New York. He is described as a member of the newest engineering class, entering the oldest engineering college in the country from the newest state in the Union.

Several thousand persons were invited to the October 1 ceremonies, including representatives of foreign engineering groups. Major excavation work was scheduled to begin later in the month. The new structure, scheduled for completion in mid 1961, will be the largest undertaking ever attempted by the engineering profession.

Plans for the Center have been over eight years in the making. A fund-raising campaign has already achieved nearly $5 million in contributions from industry and $3 million in contributions from individual engineers.

Andrew Fletcher, president of United Engineering Trustees, the organization that will own and operate the structure on behalf of the engineering societies, said that, "the primary purpose of the new structure is to provide adequate working space for the headquarters staffs of the engineering groups, which carry on extensive publishing, research and standardization programs." The second purpose, he added, "will be to symbolize the growing strength and growing unity of the engineering profession."

Land for the structure was acquired in 1957. Since that time, major efforts of UET have been directed toward design of the building and fund-raising activities.

Shreve, Lamb and Harmon Associates are the architects. General contractor is Turner Construction Company. Seelye Stevenson, Value and Knecht are structural engineers, while Jaros, Baum & Bolles are mechanical and electrical engineers.

Giant Zipper

A 500-foot belt conveyor, closed on top by a giant zipper, has been installed by a Texas rubber manufacturer to transport carbon black dust from railroad tank cars to a storage silo, reports *Petroleum Week*. The zipper is closed automatically as the conveyor is loaded, forming a tight moving tube, and is opened flat for unloading when it reaches the silo.

Important Notice!

Save the date of Thursday, December 17

The Ladies Night (scheduled for Nov. 20)
and
The General Meeting (scheduled for Dec. 15)
are being consolidated into

ONE BIG DINNER MEETING

Highlights: Citation Award to H. I. Romnes, president of Western Electric Co.

A talk, also by Mr. Romnes

Dinner with a Gay Nineties theme

Mark a 90 on your calendar, now!

New Iron Ore Body May Be Developed

Inland Steel Company has announced that it has joined the group of United States and Canadian iron mining and steel companies that is investigating the development of a large body of iron ore in the Wabush Lake area of Labrador. Philip D. Block, Jr., vice chairman, said that Inland will become a 10 per cent owner of Wabush Iron Co., Ltd., which has a long-term lease on a five-square mile tract under a concession granted by the Province of Newfoundland to Canadian and American interests for the development of mineral and timber resources.

The ore property lies near the western border of Labrador, 200 miles north of Seven Islands, the St. Lawrence River loading port for Labrador ore and 37 miles from the Quebec, North Shore and Labrador Railway. Government estimates have placed the potential of the ore body at 1,000,000,000 tons of low grade ore which will be concentrated to a material of high iron content.

Plans call for an ultimate capacity of 10,000,000 tons a year for Wabush. Development of the property for that capacity, including processing plant, townsite, railroads and shipping facilities at Seven Islands ultimately might require a total investment in excess of $200,000,000.

Pilot Plant

A pilot plant now under construction will begin shipment in 1960 in sufficient quantities for large-scale tests of the ore concentrates in steel plants. The 37-mile railroad connection to the Quebec, North Shore and Labrador Railway will be completed in time for these shipments. Construction of permanent facilities is expected to begin in 1961 with shipments to start by 1965 at an initial annual production level of 4,000,000 to 5,000,000 tons.

Other owners of the Wabush Company are The Youngstown Sheet and Tube Company, The Steel Company of Canada, Limited, Interlake Iron Corporation, and Pickands Mather & Co. Wabush is managed by Pickands Mather, one of the largest American operators of iron ore properties, with headquarters in Cleveland.

The venture will mark the first entrance of Inland Steel in iron ore in eastern Canada. A subsidiary, Caland Ore Co., Ltd., has an ore mine under development at Steep Rock Lake in western Ontario but its own operations have otherwise been in the Upper Peninsula of Michigan and the Minnesota iron ranges.

Block said the company would continue to receive the major portion of its ore needs from the Lake Superior district. At the same time, he said, opening the St. Lawrence Seaway enables a Chicago steel plant to receive ore from the East by low cost water transportation. Of the vast deposits of iron ore discovered in Labrador in the last decade, he said, he considers Wabush to have one of the best.

He said that although the Wabush ore is relatively low in iron content in the crude state, its structure is such that it can be concentrated readily into a product highly desirable for the company's blast furnaces.

To Lay 16-inch Aluminum Pipeline

A 16-inch aluminum pipeline, believed to be the largest ever made of the light metal, will be installed for Superior Oil Company in Lake Maracaibo, Venezuela.

The 1,800-foot line will be laid in the lake as a suction line for a fire protection pump at Superior's tank farm in the Altagracia area. This aluminum underwater pipeline will connect with a steel pipeline leading from shore to the tank farm. The line will have a normal capacity of 2,000 gallons of water per minute delivered to the fire protection system. The system was designed by Pipeline Technologists. Inc., of Houston.

Reynolds Metals Company will supply 25,700 pounds of alloy 5083-H113 aluminum for the one-fourth-inch wall pipe. The pipe will be fabricated by Graver Tank Corp. at East Chicago, Ind. It will be rolled and welded from quarter-inch plate.

W. H. Edwards, chief corrosion engineer for Superior, said aluminum was chosen for the big underwater line because the light metal's corrosion resistance permits installation in the lake without protective coating or wrapping.

Mr. Edwards said the 1,800-foot length of underwater pipe was needed to reach water sufficiently deep for the purpose. An aluminum riser and intake flow screen will be used on the suction end of the line.

Installation is scheduled for November.

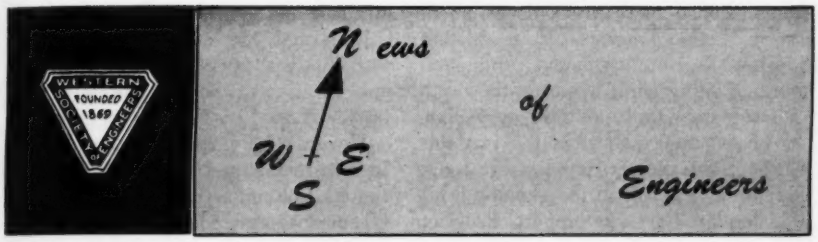
Let's Take A Trip! Where Shall We Go?

Your Excursion Committee would like your help in planning future tours.

Please tell us where you would like to go or what you would like to see and if it is possible, a tour will be arranged.

If your company has a new plant or a new process that you think the membership of WSE would be interested in seeing, please contact the committee.

Call Don Worcester, MOhawk 4-7200, Ext. 609.



or: Personals of Personable People

J. J. Koss has been appointed Milwaukee district sales representative for The Babcock & Wilcox Company's Tubular Products division, it has been announced by G. H. Weight, sales manager, middle states, for the division.

Succeeding Mr. Koss as sales representative in the Chicago district office is T. J. Nagle, who had formerly been a district sales representative in New York.

Koss began his career in 1946 in the Chicago sales district of the Globe Steel Tubes Company. When Babcock & Wilcox purchased Globe Steel in 1955, Koss remained in the Chicago district as a sales representative.

Nagle joined Babcock & Wilcox in the Tubular Products division's New York sales office in 1947. He was named a sales representative in 1957.

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Dr. Carleton C. Long, of Monaca, Pa., director of research, St. Joseph Lead Co., has been elected president of the Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers. He will take office during the Annual Meeting of the Institute, to be held Feb. 14-18, 1960, in New York City. Dr. Long will succeed Dr. John Chipman, Head of the Department of Metallurgy, Massachusetts Institute of Technology. The term is one year.

J. S. Smart, Jr., of New York City, general sales manager, American Smelting and Refining Company, has been named vice-president of the Metallurgical Society and its president-elect, slated to take office as president in 1961, following Dr. Long's term. Mr. Smart also has been elected to a three-year term on the AIME Board of Directors.

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Ralph E. Bucknam has been appointed president of Gyra Electronics Corporation, LaGrange Park, Ill., the firm's directors have announced. Gyra manufactures precision instrumentation for the electronic and nucleonic industries. In addition, Bucknam will carry the title of chief engineer, and will be responsible for the development and manufacturing activities of the corporation.

Previously, Bucknam had been affiliated with Gyra as an engineering design consultant.

After studying electrical engineering at the University of Illinois, Bucknam was employed for five years by the Burlington Railroad as a communications engineer. Subsequently, he joined the staff of the Argonne National Laboratories, Lemont, Ill. as an instrumentation engineer.

For the past three years he has been Argonne's instrumentation engineer for mass spectrometers. While at Argonne, he was responsible for designing and building all types of power supplies, including the development of the 10,000-volt continuously-variable plus-or-minus voltage supply; magnet-type current regulators; low noise preamplifiers for scintillation and multiplication counters; and general reactor instrumentation. He participated in the operations to allow one boiling-water reactor to reach criticality.

Bucknam has been a leading exponent of improved stability and reliability for basic instrumentation. He will be responsible for implementation of this philosophy to the instruments designed and manufactured by Gyra Electronics Corporation.

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Joseph H. Cadieux has been named president of Casting Engineers, a division of Consolidated Foundries & Mfg. Corp., Chicago, according to an announcement by R. D. Colburn, Consolidated president.

For the past two years, Cadieux has been vice president of Casting Engineers, and prior to that, was vice president in charge of manufacturing for Misco Precision Casting Company.

It was also announced that Casting Engineers will henceforth be completely independent of Misco, and will continue its marketing philosophy of primary

concentration in the industrial and commercial fields.

The company is one of the nation's largest producers of miniature investment castings, and is the developer of the Minicast precision production process.

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Chester E. Grigsby, vice-president and director of American Steel Foundries and general manager of its Transportation Equipment Division, on Oct. 1 became head of this Division, succeeding Charles L. Heater who has retired. Announcement was made by Joseph B. Lanterman, president. Mr. Grigsby has been with American Steel Foundries 36 years, having started as a trainee upon graduation from the University of Michigan with a degree in Mechanical Engineering. He became a vice-president in 1949, and in 1957 was also made general manager of the Transportation Equipment Division. In addition to being a director of American Steel Foundries, he is a director of Griffin Wheel Company, Griffin Steel Foundries Ltd., Pipe Line Service Corporation, and South Bend Lathe, Inc., all subsidiaries of the parent company.

Mr. Heater has been employed by American Steel Foundries nearly 40 years, having started as a trainee in the Sales Department in 1919 after graduation from Purdue University and service in World War I. He was elected a vice-president in 1939, a director of American Steel Foundries in 1946, and has been a director of its subsidiaries, Griffin Wheel Company, Griffin Steel Foundries Ltd., Diamond Chain Company, Inc., and Pipe Line Service Corporation.

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S. L. Christie, president of Christie Electric Corp., has announced the appointment of Fred Benjamin as Sales Manager of the firm's Industrial Division.

Benjamin, who brings to the Los Angeles organization an extensive engineering and administrative background in the field of Power Conversion, will devote his activities to Christie's complete and diversified line of D-C Power Supplies and Industrial Battery Charging Equipment.

In disclosing the announcement, Mr. Christie pointed out that the appointment of Fred Benjamin represents another key move in the Industrial Division's stepped-up research, development and marketing programs. He noted that a prime reason for current production and marketing gains has been the result of across-the-board industrial expansion. As one example, he cited the fact that Christie D-C Power Supplies are today playing a vital role in the gigantic 8 billion dollar Ground Support Program linked to rocketry and missiles and aircraft.

The current industrial expansion pattern, he continued, is simultaneously creating an ever-growing list of new uses of special industrial battery charging equipment.

Christie noted that Benjamin will be working in close association with the firm's Engineering Staff on new and improved product developments, as well as assisting its Sales Representatives in the field. Benjamin will also consult directly with Christie customers on matters pertaining to power conversion and industrial battery charging applications. This added liaison, the president remarked, will provide an even closer working relationship between Christie and its many customers in diversified industries across the nation.

Prior to joining the Christie organization, Benjamin held positions as director of Research and Development at American Electronics and as director of Sales and Engineering at Magnetic Systems. He will make his headquarters at the Christie home office plant in Los Angeles.

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James A. Marohn, vice president of the Crane Company, Chicago, joined Cleveland's Leece-Neville Company on October 1 as executive vice president.

The announcement was made by P. H. Neville, company president.

Prior to his association with Crane, Marohn was financial vice president of the Universal Match Corp. of St. Louis. He was also a board member and executive vice president of Magic Chef, Inc., St. Louis.

Leece-Neville is one of the nation's major suppliers of electrical equipment for automotive, truck, marine, aircraft and general industrial applications.

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Dr. Joseph L. Gillson, of Wilmington, Del., chief geologist of E. I. du Pont de Nemours & Co., has been elected president, for 1960, of the 35,000-member American Institute of Mining, Metallurgical, and Petroleum Engineers. Dr. Gillson and the other officers elected with him will take office during the Annual Meeting of the Institute, to be held in New York City Feb. 14-18, 1960.

Howard C. Pyle, of Los Angeles, president, director and chairman of the Executive Committee of Monterey Oil Co., is currently president of the Institute (AIME). He will serve until Dr. Gillson takes office in February.

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Alfred H. Belliveau, a man who at the age of 61 was elected to *Who's Who Among Students in American Universities*, has retired from Automatic Electric Company after more than 34 years with the Northlake firm.

Belliveau joined the subsidiary of General Telephone & Electronics in 1925 after reading a book on automatic telephony which had been written by one of the company's engineers.

During his long service with the telephone manufacturing company, he served in the receiving inspection, quality control, and industrial engineering departments; and as an accountant, sec-

retary, and technical writer in the laboratory organization. In 1944, he was promoted to the patent department. He became senior patent engineer in 1952.

A native of Fredericton, New Brunswick, Canada, Belliveau served as an Infantry lieutenant with the Canadian Army from 1916 to 1917, when he became an officer-pilot with Great Britain's RAF.

While residing in New Brunswick, he attended St. Joseph's College. The war interrupted his studies, but he made up for it in the following years. Since 1923, Belliveau has made a steady trek to the doors of higher learning. His list of accomplishments includes diplomas in electricity, telephony, accounting, business management, and electrical engineering — all earned through studies taken at night schools and correspondence courses.

In 1950, at the age of 56, Belliveau began work on a B.A. degree at DePaul University's evening school. His expected one year at DePaul stretched into a five-year course when he learned that a fire at St. Joseph's had destroyed their records, and his credits were lost. He was graduated in 1955 with a straight "A" average, and elected to the college "Who's Who," plus several honor societies.

In the professional world, Belliveau has been credited with seven patents for the application of telephone-type relays and switches for industrial control and automation uses. He has held membership in the American Institute of Electrical Engineers, American Institute of Management, the Investor's League of New York, and Western Society of Engineers. He served on the board of directors of the Automatic Employees Credit Union for 16 years, and was president from 1950-1955.

Following retirement, Belliveau plans to move to Newburyport, Mass. He also thinks he'll go back to school—this time to study law.

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The Society of Mining Engineers of AIME has elected Dr. Arthur B. Cummins, of Manville, N. J., Manager of Central Research, Johns-Manville Corp., to be President for one year. He will take office during the Annual Meeting of the American Institute of Mining, Metallurgical, and Petroleum Engineers, to be held in New York Feb. 14-18, 1960. Dr. Cummins will succeed Jerome W. Woomer, of Pittsburgh, head of J. W. Woomer & Associates, consultants.

The Society is a constituent part of the Institute and is the professional organization for engineers and geologists in the minerals industries. It is the largest organization of these groups in the country.

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Appointment of Cecil W. Guyatt of Pittsburgh, Pa., as chief industrial engineer of Reynolds Metals Company was announced Sept. 25 by W. Monroe Wells, vice president of operations.

Guyatt has been chief industrial engineer in charge of methods at United States Steel Corporation, where he helped pioneer industrial engineering 24 years ago.

"Aluminum is rapidly becoming a mass production industry, with larger orders and longer production runs for various products," Wells commented. "Much of the production equipment and methods used for aluminum are now comparable to those in the steel industry. Mr. Guyatt's extensive experience in industrial engineering in the steel industry will be of great value to our company in its continuous efforts to devise better manufacturing methods and reduce costs."

Hired in 1935 by U. S. Steel as its first district industrial engineer, Mr. Guyatt set up the department in the Worcester, Mass., district of the American Steel & Wire Division. From 1939 to 1941 he was assistant superintendent of the Worcester plant. In the next four years he was first assistant and then chief industrial engineer of the Steel & Wire Division. From 1939 to 1941 he was assistant superintendent of the Worcester plant. In the next four years he was first assistant and then chief industrial engineer of the Steel & Wire Division.

In 1945 he moved to Pittsburgh as assistant to the chairman of operating committees of U. S. Steel. When industrial engineering was organized throughout the corporation in 1948, he was made a division chief industrial engineer. In 1951 he became chief industrial engineer - methods.

Born in Wedensbury, England, Mr. Guyatt was brought to the United States by his parents at the age of 3. He graduated from Hackensack High School, Hackensack, N. J., and from Lehigh University with an electrical engineering degree.

He was a cadet engineer at Public Service Electric & Gas Company in New Jersey and head of the time study department at Eclipse Aviation Company before joining U. S. Steel.

A licensed amateur radio operator, Mr. Guyatt operated station K3ABN in Pittsburgh and will move his station to Richmond. He is a member of the Society for Advancement of Management.

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Cecil Boling, president, Dunham-Bush, Inc., has announced the appointment of Frank D. Klein as General Manager of the company's Michigan City, Indiana plant. Klein goes to Michigan City from the Dunham-Bush main office in West Hartford, Connecticut where he was product manager, Air Conditioning.

Previously, Klein was chief engineer of Governair Corp., and regional manager for U.S. Airco. A graduate of the University of Michigan, B.S., M.E., he is a member of ASHRAE, ASTM, ASME and a lecture member of Franklin Institute. He is the author of numerous textbooks and technical papers in the refrigeration field.

Reviews of Technical Books

Oil Hydraulics

Trouble-free Hydraulics, by Ian McNeil, The Ronald Press Company, New York 10, N.Y. Pages, 124. Price, $6.50.

Trouble-free Hydraulics presents a practical handbook on maintenance and fault finding in oil hydraulic machinery, written in terms of maintenance requirements to prevent machine breakdown and tracing and remedial measures to be carried out.

Subjects are covered in concise form with ease of reference and include Principal Elements of a Hydraulic System, Approximate Service Life, Principal Stock Replacement Items, Oil Velocities and Working Temperatures, Micron Equivalents, Viscometer Conversion Equivalents, Working Pressures on Seals, and Spring Loading of Packings. Included are 34 explanatory tables and 23 line drawings.

The two chapters on Pipework and Oil Tanks, and Hydraulic Fluids and their Treatment furnish numerous important aspects of flow, pressure and fluid characteristics. Different types of pipe material are discussed and the effects of pumps and motors on piping analyzed. Oil based, water based, or synthetic based chemical compounds are compared for use in hydraulic circuits.

The handbook contains two parts. Part I is devoted to exposition of the principles applicable to the main subjects. Part II is an explanation of 12 fault finding charts. The appendix includes a table of safe internal working pressures for cold drawn seamless steel tubes, and pressures, volume, heat and power equivalents.

Engineering Drawing

Fundamentals of Engineering Drawing by Warren J. Luzadder, Prentice-Hall, Inc., New York 11, N.Y. Pages, 720. Price, $10.00.

Fundamentals of Engineering Drawing presents an up to date guide for drawing room practice. Designed for the beginning student, it is uniquely easy to use on a self teaching basis regardless of the student's background of knowledge.

This fourth edition stresses essential fundamentals, the use of instruments, lettering, engineering geometry, multiview drawing and the language of the draftsman and the engineer. Accepted and time proven practices are incorporated in the book of the latest American Standards Association (ASA) and the Society of Automotive Engineers (SAE) standards have been made available for use in the classroom as soon as possible after they have been approved and accepted by American industry.

Among the major revisions are the chapters on dimensional practices which has been greatly expanded, and welding drawing, which has been thoroughly revised in accordance with ASA standard.

There are 400 illustrations which graphically utilize surface shading and other modern techniques. These have been developed and strengthened through recent practice and research, which will aid the draftsman and engineer in developing drawings, which will more clearly describe the shape and size of structures and mechanisms.

Space Technology

Space Technology, by 38 scientists, John Wiley & Sons, Inc., New York 16, N.Y. 1959. Pages, 1188. Price, $22.50.

The first launchings of minimum Mars probe vehicles are likely toward the end of 1960, or surely at the time of Mars' next succeeding conjunction in 1962. Flight to the neighborhood of more remote planets, however, will not be possible before 10-20 years, first with unmanned instrumental vehicles, later for men themselves. Science fiction notwithstanding, flight past the solar system is beyond our present comprehension, if not impossible, since it would require vehicular speeds approaching the speed of light.

Conjecture? No, the down-to-earth appraisal of 38 top scientists (see list below), who have pooled their resources in the writing of *Space Technology*. The volume is under the editorship of Howard S. Seifert of California's Space Technology Laboratories.

Literature has already carried man out to fantastic distances. Realistically, the integration of many scientific disciplines—astronomy, aerodynamics, electronics, chemistry, mechanics, and biology—is required to send living astronauts into comparatively near reaches of space. *Space Technology* is by no means summer reading, as its publisher must frankly admit. If some conjecture slips in, the new book is for the most part intent on technicalities—flight dynamics, propulsion and structure, communications and guidance, mathematics, physics. It will be no mean feat to shoot a man into space, to feed and clothe him during the journey, to attend to his medical needs, to get him back again.

Chapter headings and contributors in *Space Technology* are:

1. Why Space Technology?—L.M.K. Boelter and Howard S. Seifert
2. The Unknown Cosmos—H. Guyford Stever
3. Flight Performance of a Rocket in Straight-Line Motion —Martin Summerfield and Howard S. Seifert
4. Trajectory Optimization for Powered Flight in Two or Three Dimensions—Burton D. Fried
5. Earth Satellites and Related Orbit and Perturbation Theory—Samuel Herrick
6. The Vanguard IGY Earth Satellite Launching Trajectories and Orbits—Joseph W. Siry
7. Lunar Flight Trajectories—Robert W. Buchheim
8. Interplanetary Operations—Krafft A. Ehricke
9. Low-Trust Flight: Constant Exhaust Velocity in Field-Free Space—David B. Langmuir
10. Low-Thrust Flight: Variable Exhaust Velocity in Gravitational Fields—Jack H. Irving
11. Time Dilatation Effects in Space Travel—Herbert C. Corben

12. Recovery Dynamics—Heat Transfer at Hypersonic Speeds in a Planetary Atmosphere—Lester Lees
13. The Possibility of a Safe Landing—Alfred J. Eggers, Jr.
14. Chemical Rocket Fundamentals—Howard S. Seifert
15. Liquid Propellant Rocket Engines—George P. Sutton
16. Solid Rocket Propulsion—John I. Shafer
17. Nuclear Rocket Propulsion Possibilities—Robert W. Bussard
18. Magnetohydrodynamics—Milton U. Clauser
19. Structural Configurations, Analyses, and Materials for Space Vehicles—Ernest E. Sechler
20. Integrated Design Analysis—Millard V. Barton
21. Feasibility of Space Communications — Eberhardt Rechtin
22. Space Communication Implementation Problems — Frank W. Lehan
23. Problems of Radio Guidance—William H. Pickering
24. Inertial Guidance for Ballistic Vehicles—William T. Russell
25. Radio-Inertial Guidance—Donald P. Ling
26. Midcourse and Terminal Guidance—Albert D. Wheelon
27. The Physical Factors of the Space Environment—Heinz Haber
28. The Medical Aspects of Manned Space Flight — Hubertus Strughold
29. Space Cabin Design and Personal Equipment—Alfred M. Mayo
30. Crew Performance in a Space Vehicle—Craig L. Taylor and W. Vincent Blockley
31. IGY Research in the Upper Atmosphere—Joseph Kaplan and Charles A. Barth
32. Scientific Uses of Space Vehicles: Satellite Experiments —James A. Van Allen
33. What the Future Holds—Howard S. Seifert, Simon Ramo, Richard W. Porter, Elmer P. Wheaton, Arthur R. Kantrowitz

Package Design

Package Design Engineering, by Kenneth Brown, published by John Wiley & Sons, New York 16, N.Y. 1959. Pages, 263. Price, $8.50.

It's a far cry from a jack-in-the-box to a jet engine but both, facing the rigors of transportation and storage, require special pampering in their modes of packaging. That a shipping container is a personalized thing becomes clear in this book.

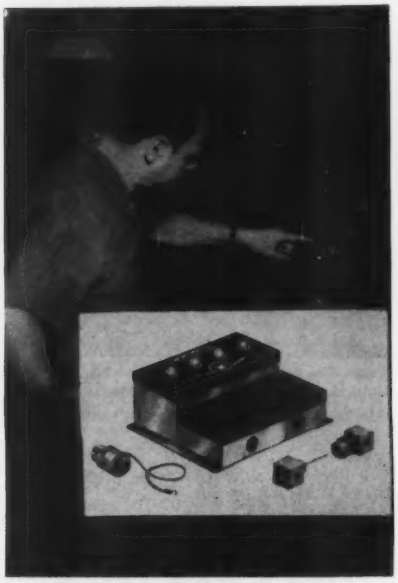
Mr. Brown elects a fundamental engineering approach to his subject and maintains a balance between military and commercial applications. He first covers the basic fundamentals in static and dynamic mechanics, strength of materials, and stress analysis. This information establishes the background needed by the packaging engineer to solve structural and dynamic packaging problems. The author then devotes considerable attention to the design characteristics of the four most common suspension systems: tension spring, rubber shear mount, solid cushioning, and canvas strapping. Discussed at length are the peculiarities of corrugated, sheathed crate, plywood, and metal shipping containers. In conclusion, the volume illustrates the engineering fundamentals and design application of dehumidification and pressurization, vibration, and package test instrumentation.

New Products

As described by their Manufacturers

Electronic Control Unit

A new electronic control unit that automatically stops an injection molding machine from applying clamping pressure when dies are not closing properly has been developed by Wintriss, Inc.,



New York. Circuit-Master Automold, according to the manufacturer, protects molds, reduces downtime and material waste without slowing the machine's normal molding cycle.

Circuit-Master Automold receives information from two sources—a pressure sensor fastened to the die cylinder and a position sensor mounted on the mold. Whenever the die cylinder's hydraulic pressure exceeds a pre-determined setting due to a misalignment of die parts, tightening of die pins, lack of lubrication, foreign matter lodged in the molds or other malfunction, Automold automatically stops and reverses the die piston's forward motion and opens the mold.

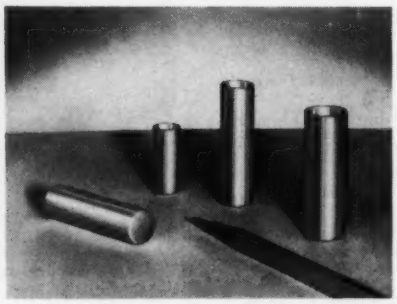
Completely self-adjusting and automatic, Circuit-Master Automold requires no settings or adjustments after initial setup, and automatically compensates for expansions due to temperature and mechanic changes.

Detailed information and prices available from Wintriss, Inc., 20 Vandam Street, New York 13.

Impact Extrusion

Successful developments of mass-production low-cost procedures for impact extrusion of small magnesium battery cans, closed end, with exceptionally thin walls and high length-to-diameter ratio is announced by White Metal Rolling & Stamping Corporation.

These small cylinders, now in production in a number of sizes, are being



used as battery cans for military applications to utilize the higher voltages attained with magnesium, which are approximately two those of zinc cells. The lighter weight of magnesium is an additional advantage.

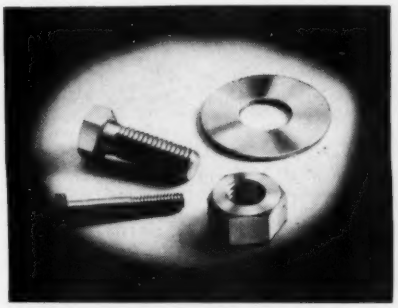
Pure magnesium or various magnesium alloys, can be used in these impact extrusion containers. Designers in other fields may find answers in their low cost and light weight, and in the electrochemical properties of magnesium as a source of higher voltage batteries, cathodic protection, and other out-of-the-ordinary applications.

Further information on the technique used in producing these containers, and its applicability to fabricating other shapes, is available from White Metal Rolling & Stamping Corporation, 92 Moultrie Street, Brooklyn 22, N. Y.

Titanium Bolts

Star Stainless Screw Company, Paterson, N. J., has announced it now has facilities to custom-manufacture titanium bolts, nuts and washers to customers' blueprints and specifications.

The strong, lightweight, exceptionally corrosion-resistant titanium bolts, nuts and washers will be precision manufac-



tured to meet exact tolerances and rigid specifications.

The company presently carries more

than 7,000 different types and sizes of stainless steel fasteners plus an almost equal number in brass, aluminum, bronze, monel and mold nylon.

Detailed information on the new titanium bolts, nuts and washers available from Star Stainless Screw Co., 699 Union Blvd., Paterson 2, N. J.

Literature

Valve Wall Chart

A handy wall chart, "Recommended Piping Practice," which is suitable for posting on shop bulletin boards, has been published by the Lunkenheimer Company of Cincinnati, Ohio. The three-color, 17 x 22-inch chart is useful for installation and maintenance personnel and individuals requisitioning valves of all types.

The fully illustrated chart is divided into five sections, entitled "Basic Valve Types," "Connections Normally Used," "Installation and Maintenance Tools," "Installation," and "Operation and Maintenance," for easy reference by plant personnel.

Illustrations of items from Lunkenheimer's complete line of valves, engineering specialties and lubricating devices, appear on the back of the wall chart.

Free copies of the "Recommended Piping Practice" Wall Chart may be obtained by writing to the Lunkenheimer Company, Cincinnati 14, Ohio.

Hardness Ranges

The four new hardness ranges of Jalloy, a heat-treated and abrasion-resistant alloy steel, are described in a pamphlet just published by Jones & Laughlin Steel Corporation.

The J&L booklet gives specifications for each of the four hardness ranges of Jalloy, which are produced by controlled chemical composition and selective heat treatment.

Also covered in the eight-page booklet are such factors as weldability, heat treatment, mechanical properties, fabrication, and corrosion and abrasion resistance of the various hardness ranges.

Jalloy is widely used for such construction and mining equipment as bulldozer liners, scraper blades and drag line buckets, coal and ore car bodies, chutes and deck plates, and other applications.

Copies of the new booklet may be obtained by writing: Jones & Laughlin Steel Corporation, Public Relations & Advertising Department, 3 Gateway Center, Pittsburgh 30, Pa.

Aluminum Alloys

An informative, new technical brochure outlining the various properties of Olin Aluminum alloys in pig, ingot and billet forms, has been made available by Henning Brothers & Smith, Inc., Brooklyn, smelters and refiners of aluminum, bronze, brass, zinc, and lead.

The authoritative eight-page booklet, published by Olin Aluminum division of Olin Mathieson Chemical Corp., lists in chart form: typical physical properties of aluminum casting alloys; comparative ratings of aluminum castings by various casting methods; typical mechanical properties of aluminum casting alloys; pig, ingot and billet compositions. The properties and specifications of aluminum alloys are compared and the utilization of the various alloys in different types of casting methods are discussed.

Copies of the new brochure available from Olin's Northeastern distributor, Henning Brothers & Smith, Inc., 91-127 Scott Avenue, Brooklyn, N.Y.

Variable-speed Drives

A new 96-page catalog, designated M-592, explains in brief copy and many photos and drawings the wide assortment of styles, modifications and accessories available in the complete line of Reeves mechanical variable-speed Motodrives. The Vari-Speed Motodrive, available in capacities from ¾ through 40 horsepower, provides infinitely adjustable speeds within ranges of from 2:1 to 10:1 from a constant rpm. a-c. motor source.

The catalog includes construction features, specifications, speed and rating tables, and pricing information.

Individual copies of catalog M-592 are available free by writing on your company letterhead to Reeves Pulley Division, Reliance Electric and Engineering Company, Columbus, Indiana.

Shock Detection

The V-Dot Indicator, a basically simple, foolproof shock detection device for shipments of delicate instruments and precision equipment in transit, is described in an illustrated bulletin available from the designers and manufacturers, Inertia Switch, Inc., New York.

The bulletin discusses in detail the principle, operation and applications of the V-Dot Indicator.

Each V-Dot Indicator is pre-set and sealed to trigger at a specific shock level. Any excessive shock from any direction on a single plane will dislodge the device's indicator, which, according to the bulletin, cannot be moved again except by breaking the seal, removing the case and resetting it by hand.

Copies of the bulletin can be obtained by writing Packaging Protection Division, Inertia Switch, Inc., 311 West 43rd St., New York.

Cloud Seeding Economic Value Proved

A California meteorologist reported in Denver on Aug. 27 that studies have proven that the economic value of cloud seeding, for inducing additional precipitation in areas where there is deficit rainfall, far exceeds its cost.

Speaking before the Conference on Weather Modification by Artificial Means, in session here, Robert D. Elliott, president, North American Weather Consultants, Goleta, Calif., said that the value of seeding exceeds the cost by one to two orders of magnitude. Mr. Elliott discussed "Seeding of West Coast Winter Storms."

The meteorologist stated that a 10 per cent increase in snowpack during winter storms, and in consequent runoff, may result in as much as 100,000 extra acre feet of water available for storage, from a watershed target area of 1,500 square miles.

Value of Water

"The value of this water for hydroelectric generation of electricity may range from $3 to $20 per acre foot, depending largely upon the head," Elliott said. "The value is considerably less if the watershed is not fully developed, or if water has to be spilled at peak flow."

Elliott noted that two scientists, R. R. Reynolds and E. P. Warren, computed the economic value of cloud seeding increases to a typical California irrigation district covering 190,000 acres of which 150,000 acres are under cultivation.

In this computation, if the watershed area of 1,550 square miles experiences a 10 per cent increase in precipitation, an average 15 per cent increase in runoff could be expected. In a dry year, a 28 per cent increase would result. As a result of these increases, 10 per cent additional lands, or 15,000 acres, would be brought under irrigation.

The value of this would be $1,125,000 a year. Value to adjacent dry farming grain areas was computed to be $48,000 per year, and range land would benefit $100,000 a year.

A computation also was made of the value in marginal dry farming areas, using historical wheat-weather crop yield relationships from the Great Plains of North Dakota, South Dakota, and Nebraska. A 10 per cent increase in annual mean precipitation would permit a 51 per cent increase in farm value, and a 31 per cent increase in the number of farms. If each farm represents one family, the additional water would support more than 56,000 families in the states mentioned.

"The cost of cloud seeding geared to the applications mentioned is on the order of $20,000-$30,000," Elliott said. "It is clear, therefore, that the value exceeds the cost by one to two orders of magnitude.

"This explains to a great degree the sustained interest and participation in many cloud seeding projects even though it is not possible with present observational data and statistical techniques to obtain definitive results in any given place, even over a period of several years. It is a matter of taking a calculated risk."

Conductor Diameter and Ice

Transmission of extra high voltage electricity has resulted in the use of larger diameter conductors and the natural assumption would be that the larger conductors would accumulate thicker ice in winter.

But it does not appear to be so, four engineers reported at a transmission and distribution symposium during the Fall General Meeting of the American Institute of Electrical Engineers at the Morrison Hotel in Chicago on Oct. 14. The four reported on ice tests of conductors from one quarter of an inch to one and three quarters inches in diameter and came to the conclusion that the smaller diameter conductor gathers thicker ice.

The tests were made at the Aluminum Company of America's Cleveland Works, and at Massena, N.Y. The tests were made originally in a laboratory at Massena, then the equipment was dismantled and sent to Cleveland for further testing.

"The tests indicated that the ice thickness is fairly constant on medium and large size conductors, but that ice thickness is greater on the smaller conductors," reported E. K. Lanctot and H. E. House, Aluminum Company of America, and E. L. Peterson and E. S. Zobel, American Electric Power Service Corp., New York. "For example, a fairly uniform thickness of ice was formed on the test conductors with diameters in the range of 1 in. to 1¾ in., but this thickness was about 20 percent greater on the smallest conductor tested, which was ¼ in. in diameter."

They pointed out that the tests were not conclusive, but hoped that others will make similar experiments and that reports will be made on actual ice conditions.

Live Conductors

Attempts to string telegraph lines through the Masai tribal areas of Africa were almost foiled recently by necklace hunters, reports *American Machinist.* Wire was disappearing from poles as fast as it could be strung until linemen discovered natives were stealing the wire to make the coiled necklaces that cover the necks, arms and legs of their women.

Luncheon Meetings Continue Success
Series II Tickets are now on Sale

Series I is now approaching its end. And it may be said that the dinner meetings of the series, each of them, have been highly successful. They have all been of the type that it is a pleasure to attend—interesting, stimulating, and pleasant—attested to by the fact that attendance each Wednesday approached 100.

Much of the success of Series I is attributable to the Luncheon Booklets of 10 tickets. This guaranteed a good speaker which in turn guaranteed a good audience.

The idea of the Luncheon Booklets is being continued for Series II, and Books of tickets are now on sale. Each Book of 10 tickets sells for only $15, or $1.50 per ticket as compared with $1.75 for individual tickets.

Each Book of tickets will be registered as designated by the purchaser. Each ticket is transferable for the date shown and will guarantee the ticket holder a seat.

In addition to being assured a good seat for the luncheons, the Book of tickets adds to their value for business entertaining. If the holder can't attend the luncheon, the ticket can be given to some one who can attend.

The luncheon committee hopes to have at least 100 Series II ticket Books out so that every luncheon speaker will be assured, as in Series I, of a capacity audience. With that assurance a program of nationally known speakers on all important phases of engineering programs will be arranged. It is believed that with the support of WSE members and their organizations it will be possible for the WSE luncheons to continue to command the same prestige for engineering as the Executive Club luncheons do for business.

Send in your order today for one or more of the Series II luncheon books.

Series I

Below are listed some of the interesting meetings of the Noon Luncheon Series now in progress:

SEPT. 23, 1959 "Electrical Heating in Homes of the Future"—Robert C. Geyer of Commonwealth Edison Company told of the steps being taken to provide electrical heating within the reach of the homeowner.

SEPT. 30 "Space Programs of the U.S. and the U.S.S.R." — Robert I. Johnson, Acting Director, Adler Planetarium discussed the latest data from man-made satellites and the differences in objectives of space programs between the U.S. and the U.S.S.R.

OCT. 7 "Psychological Warfare Against Recession"—Wesley I. Nunn, Graduate Director, Advertising Council, introduced this film, a dramatization of the importance of public confidence in preventing financial panics.

OCT. 14 "Chicago's Future as a World Seaport" —James J. Pisco, Chief Engineer, Chicago Regional Port District, made a prediction of the effect of the St. Lawrence Seaway on Chicago's shipping industry.

OCT. 21 "Unique Construction Methods on the Union Dome at Wood River, Ill."—Mr. R. C. Ulm, Manager, Product Research, Graver Tank Co., discussed how his company erected a structure with a cushion of air. Jointly sponsored with the Bridge and Structural Section.

OCT. 28 No W.S.E. meeting. American Society of Mechanical Engineers has a luncheon scheduled.

NOV. 4 "Human Engineering"—Mr. S. L. Jewell, Vice-President, Peabody Coal Co., gave some thoughts for engineers to keep in mind when dealing with people.

NOV. 11 "Railroading in the Atomic Age" — Douglas Campbell, Vice-President, New York Central R.R., Chicago, tells what the railroads are doing to meet the coming demands for speed, safety and economy in transportation. Jointly sponsored with the Transportation Section.

Series II

At a recent meeting, the Noon Luncheon Committee organized a tentative list of interesting speakers. The committee is asking these highly desirable speakers to appear before a Wednesday Luncheon Meeting. Some have already accepted, and you may rest assured that most of the others will also accept, particularly after the enthusiastic reception given to the Series I speakers.

The Luncheon Committee's list includes the following speakers:

—Clifford C. Gregg, director of the Chicago Natural History Museum

—Judge Sigmund Stefanowicz, of the Municipal Court of Chicago

—Robert Babenek, a scientist with the American Machine & Foundry Co.

—Gaylord Donnelley, president of R. R. Donnelley & Co.

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				17,	WSE
Jan.	6, 1960	WSE		24,	*ASME
	13,	WSE	March	2,	WSE
	20,	WSE		9,	WSE
	27,	*ASME		16,	WSE
Feb.	3,	WSE		23,	*ASME

*The Chicago Section of the American Society of Mechanical Engineers has scheduled luncheons at WSE during the season. Contact Chicago section for tickets.

Luncheon Committee,
Western Society of Engineers
84 East Randolph Street, Chicago 1

Yes, I would like to support your committee in your plan to assure attendance at WSE luncheons. Here is my check for $_____ to cover _____ Series II books at $15.00 each. It is my understanding that each ticket is transferable for the date shown and may be given to a WSE member or to a non-member.

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Future of Actinide Elements Described

An American scientist on Sept. 4 told chemists assembled in Munich for a worldwide conference about the possibility of producing large quantities of valuable artificial elements by means of underground atomic detonations.

Dr. William W. T. Crane, chief of advanced development in isotopic power for the Nuclear Division of The Martin Company, Baltimore, Md., described the system in a talk on "The Future of the Actinide Elements" at the 17th International Congress of Pure and Applied Chemistry.

Earlier the same week Dr. Crane told delegates to the London meeting of the International Astronautical Federation how isotopes of such an artificial element, Curium, could be used in thermoelectric conversion devices to provide electrical power for decades to unmanned transmitters and measuring instruments.

One Martin-built "isotopic battery," designated SNAP-3 (System, Nuclear Auxiliary Power), has been producing power continuously since January, when it was first displayed publicly at the White House in Washington. It has no moving parts and literally cannot "wear out."

Limitation

The chief limitation upon devices of this type at present is the high cost or relative scarcity of suitable radioisotopes. Some of the most attractive "fuels" do not occur in nature and must be produced artificially. According to Dr. Crane, Plutonium-239, a material already in production, could be converted by irradiation to Plutonium-242. This new material, when subjected to a nuclear detonation in a confined area, such as an underground cave on the atomic test range, would absorb neutrons in such a way as to yield "hundreds of grams of Americium-243 and Curium-244" and significant quantities of two other artificial elements, Berkelium and Californium. Chemical means could then be fused to separate these from other fused salts.

Although the quantities involved still seem quite small to the layman, Dr. Crane pointed out that when he was first assigned to investigate the chemical properties of Curium at the University of California in 1948, the total amount of the new element in the United States was only 10 micrograms — about one three-millionth of an ounce.

Plutonium, one of the artificially produced elements, has been prized primarily because it can be used as a fissionable material in A-bombs or advanced nuclear reactors; but the Martin scientist pointed out several other peacetime uses for trans-uranic elements:

Peacetime Uses

1. Individual atoms of Californium-252 fission spontaneously, but they do so at a much slower and controlled rate than either Uranium-235 or Plutonium. This gives scientists an opportunity, in effect, to watch the fission process "in slow motion." Because the number of neutrons released in the process is small enough to be calculated accurately, Dr. Crane said that Californium-252 could also be used to calibrate measurements of neutron flux and nuclear cross-section more accurately in various laboratories around the world.

2. Plutonium-238, Curium-242 and Curium-244 hold great promise as completely reliable and safe energy sources for navigation buoys or remote weather stations. As these radioisotopes decay in a closed container, considerable heat is produced in the walls of the container. By a thermocouple arrangement like the one used in SNAP-3, this heat can be converted directly into electrical power.

Curium-244 and Plutonium-238 are ideal for extremely long missions, since their power output will drop by only 50 per cent over a period of about 18 years and 86 years, respectively. Curium-242 has a much shorter "half-life" (about five and a half months), but its power density is so great that it can be used in exceptionally compact energy sources. One cubic centimeter of pure Curium-242 produces 854 watts of continuous heat.

In his London talk, Dr. Crane stressed safety factors, pointing out that the "alpha particles" emitted by all three isotopes mentioned are the easiest form of radiation to shield against. Films accompanying his talk showed tests by Martin-Nuclear in which isotope containers safely survived temperatures ranging from minus 285 to more than 2000 degrees Fahrenheit, high-speed impact at various angles against earth and rock surfaces, and even large explosions.

Sargent & Lundy Change Structure

Sargent & Lundy, Chicago consulting engineers, have recently changed their organizational structure to give full departmental status to their nuclear activities.

Alf Kolflat, MWSE, the firm's Senior Partner, stated in his announcement of the change, "While Sargent & Lundy has long been active in the nuclear field, the growing importance of nuclear developments in the power industry has led us to place more emphasis on this phase of our work. The organizational change will greatly facilitate the efficient execution of our present and future nuclear projects." Fred W. McCloska has been named to head the department.

AAAS
Annual Meeting
Section M
Engineering Program
Chicago, Illinois
Dec. 28-29, 1959
National and International Aspects of Systems of Units
Operation SCUDS:
Simplication
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PART I

Monday Morning December 28

THE CONFUSION OF CHAOS IN UNITS Carl F. Kayan, Presiding

1. International Viewpoint of an American Engineer on Units. WALKER L. CISLER, President, American Society of Mechanical Engineers, New York, N. Y.

2. Should American Industry Convert to the Metric System?—Summary of Views Recently Expressed by Industry. G. F. HUSSEY, Jr., Managing Director, American Standards Association, New York, N. Y.

3. Our Units of Weights and Measures. LEWIS V. JUDSON, Office of Weights and Measures, National Bureau of Standards, Washington, D. C.

4. International Challenge to American Education and its Relationship to the Unit System. JOHN J. THEOBALD, Superintendent of Schools, New York, N. Y.

5. Farmers' and Grain Processes—Unit Simplifications. HAMILL VARNER, Manager, Grain Purchasing Department, Quaker Oats Company, Chicago, Ill.

6. The Chaos in Consumer Goods Packaging. COLSTON E. WARNE, President, Consumers Union, Mount Vernon, N. Y.

PART II

Monday Afternoon December 28

PUBLIC EDUCATION VS. THE CONSUMER PUBLIC H. C. Diehl, Presiding

7. Decimalization in the Schools. JAMES H. SMITH, Associate Superintendent of Instruction, Board of Education, Chicago, Ill.

8. Children vs. Decimals and Other Fractions. LORE RASMUSSEN and DAVID A. PAGE, University of Illinois Arithmetic Project, Urbana, Ill.

9. Food Container Standardization and the Public Interest. HOWARD STIER, National Canners Association, Washington, D. C.

10. Packaging Identification and Marking. ALLYN C. BEARDSELL, Director of New Products Division, The Mead Corporation, Cincinnati, Ohio.

11. Common Fractions vs. Decimals in Stock Exchange Reporting. ROBERT M. BISHOP, Special Assistant to the President, New York Stock Exchange, New York, N. Y.

PART III

Tuesday Morning December 29

PROBLEMS OF DESIGN, MANUFACTURE AND COMMERCE Robert J. Painter, Presiding

12. An Investigation of the Effect of Foot Decimalization on Building Design and Construction Processes. PERRY COKE SMITH, Architect, Voorhees, Walker, Smith, Smith and Haines, New York, N. Y.

13. Measuring Units for the Textile Industry — Present and Prospective. ARTHUR D. SCROGGIE, Textile Fibers Department, E. I. duPont de Nemours & Co., Wilmington, Del.

14. English and Metric Systems of Measurements in the Forest—Products Industries and Their Effect of Manufacturing and Construction Practices. A. J. PANSHIN, Head Department of Forest Products, Michigan State University, East Lansing, Mich.

15. Machine Tools and the Inch—Meter Conversion. H. S. SIZER, Director of Design, Machine Tool Division, Brown and Sharpe Manufacturing Co., Providence, R. I.

16. Weighing with Decimals. R. E. BELL, Chief Engineer, Toledo Scale Division, Toledo Scale Corporation, Toledo, Ohio.

17. Pro's and Con's of the Weighing Problem vs. Decimal and Metric Changeover. C. G. GEHRINGER, Manager, M-Scale Division, Fairbanks, Morse and Co., Chicago, Ill.

Part IV

Tuesday Afternoon December 29

THE LOOK TO THE FUTURE Clarence E. Davies, Presiding

18. The Decimal Idea in Handling Units. CHAUNCEY D. LEAKE, President-Elect, American Association for the Advancement of Science, Washington, D. C.

19. Progress Report on the Changeover Problems for Great Britain. A. H. HUGHES, Deputy Chairman, British Association Metric Committee, London, England.

20. Status of NBS Study-Project on Ways and Means to Accelerate Metric Changeover in the U.S.A., A. V. ASTIN, Director, National Bureau of Standards, Washington, D. C.

21. Impact of the Multiplicity of Technical Disciplines on Unit-System Usages. GUY WADDINGTON, Office of Critical Tables, National Academy of Sciences—National Research Council, Washington, D. C.

22. Accelerated Progress in the Automotive Decimalization Program. ROY P. TROWBRIDGE, GM Engineering Standards, General Motors Company, Detroit, Mich.

23. Parke-Davis Adopts the Metric System. DON G. NEILL, Manager, Materials Handling Department, Parke-Davis Company, Detroit, Mich.

24. Highlights of the Special AAAS Report on Metric Usage. WILMER SOUDER, Chairman, AAAS Committee on Metric Usage, Washington, D. C.

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New Safety Techniques to Keep Pace

Revolutionary new techniques of industrial safety engineering will be developed to keep pace with the phenomenal growth of the chemical processing industry, according to predictions of Arthur H. Christian, corporate safety engineer for American Viscose Corporation, one of the nation's major chemical processing companies.

Airborne fire-fighting fleets, complete underground chemical processing plants, floating seaborne industrial cities, isolated industrial parks with "atmosphere conditioning," automatic anti-accident devices such as miniature safety packs that would analyze for preselected hazards and stop the process—these are but a few of the innovations anticipated by Mr. Christian.

Speaking before the Industrial and Engineering Chemistry Division at the National Meeting of the American Chemical Society on Sept. 16 in Atlantic City, N.J., Mr. Christian pointed out that the accelerating rate of expansion in chemical processing will demand unorthodox approaches to the problems of industrial safety, much as did the field of atomic energy.

Mr. Christian believes that with scientific development of new sources of energy, future chemical processing plants may well be located deep underground, close to raw materials and utilize energy from deep within the earth. He also foresees industrial cities floating far at sea close to raw materials from the ocean depths, and using solar or sea energy. Such plants would be remotely controlled and practically uninhabited. A step into the future beyond this will almost certainly see chemical processing plants on space platforms and other planets.

Industrial Parks

Predicting improvements in chemical operations as we now know them, Mr. Christian believes there will someday be great industrial parks with common services such as chemical waste disposal plants, maintenance groups, and entire areas that are "atmosphere conditioned."

Present processing operations will also be re-engineered to provide for continuous processing which will be remotely controlled.

"One central control room, far removed from the hazardous area, manned by one man, will control several processes. American Viscose Corporation's new Marcus Hook, Pa., cellophane plant —one of the most highly instrumented in the industry—is a significant step in this direction," he said.

Through use of closed circuit television and rapidly developing electronic techniques, contact between people and chemical processing will be virtually eliminated. Equipment will be fail-safe, will check itself out, and will automatically replace faulty miniaturized and unitized components, he predicts.

Discussing the interim period between the present and such future developments as space platforms and floating industrial cities, Mr. Christian cited the increasing exposure of the public to greater hazard during the transportation of chemicals. While it is standard practice to provide for all contingencies of fire and explosion within the confines of a chemical plant, this is not now possible in the same manner for tank cars and trucks laden with explosive chemicals.

"Airborne firefighters may become more common of necessity—a helicopter fleet can attack a tank car fire in the desert, on a bridge, or in a canyon. With special extinguishing agents and systems, they could cover economically several industrial chemical settlements, also," Mr. Christian asserted.

Other Innovations

Other innovations AVC's safety engineer sees in the reasonably near future is a completely versatile explosion detection system that reliably senses an explosion at its inception and automatically prevents it; fire extinguishment by sound waves or electronic beams that absorb energy; encapsulation of workers for personal protection.

Despite all that science and industry may do to minimize the hazards of handling large volumes of dangerous chemicals, there will always be the problem of man himself. Radical steps may someday

be taken, such as administration of a safety vaccine, environmental tempering as with gasses, or periodic electronic treatment, to induce a desirable level of safety awareness through increased conscious thought flow, Mr. Christian suggests.

Accident proneness from industrial hypnosis caused by repetition and boredom may be minimized by tempering environmental impact on the senses, he predicts. By musical change of pace, light manipulation, odor control, even the feel of raw materials where they must be touched, it is possible to increase the alertness of the industrial employee.

Disabilities

Whether accidents occur at home or at work, Mr. Christian holds bright hope that permanent disability can be minimized. Great advances in medical science offer the prospect that replacement of body parts will be an extensive technology with complete eye banks, limb grafts a common technique, and major sections of the body replaceable.

So if all efforts at accident prevention fail to protect man from himself, there is still the hope that the doctors can put Humpty Dumpty together again!

ASA Publication Explains Activities

Is anyone working to establish a standard method of fire-testing building construction and materials?

Who sponsors the American Standards Association project on building code requirements for structural steel?

Who is chairman of the ASA sectional committee on modular coordination of dimensions of building materials and equipment?

These and other questions concerning standardization activities in the construction industry are answered by a new publication called "Current Projects of the American Standards Association," just released by ASA.

A total of 425 American Standards projects are described in the 52-page booklet. In addition to listing the projects under ASA's 19 standards categories, the booklet describes the scope of each project, provides an index and lists the sponsors. Where the project is handled by a sectional committee operating under ASA auspices, the officers of the committee are listed.

A short preface describes the benefits of standards, and how standardization is carried out under ASA procedures.

With the current emphasis on increasing efficiency and cutting costs, businessmen are turning more and more to standardization on a national and even an international level as a means of combating the profit squeeze. The new booklet was published as a handy reference for engineers, purchasing agents, and, in general, all businessmen who are interested in learning what American Standards activities are related to their companies' operations and their industry interests.

Coordinating Body

ASA is the coordinating body for voluntary national standardization in the United States, and also represents U. S. interests in international standards work. A nonprofit organization, it provides means for developing voluntary national standards acceptable to a consensus of the national groups concerned. More than 120 organizations and 2,000 companies are members of ASA.

Some 4,000 experts in many fields work on ASA sectional committees, set up under ASA procedures to write standards in about two-thirds of the projects listed in the new booklet. Thousands of more experts work on the standards committees of engineering societies, trade associations, government agencies, and other national groups. Standards established by these committees may be submitted to ASA for approval as American Standards as is the case with hundreds of standards of the American Society for Testing Materials.

"Current Projects of the American Standards Association" is available from ASA, Dept. PR 94, 70 East 45th Street, New York 17, N. Y. Price per copy is 75c for members and $1.50 for nonmembers.

Are Plastics Answer to Re-entry?

Plastics may be the answer to the re-entry of missiles and space ships into the earth's atmosphere, it was indicated in St. Paul, Minn. on Sept. 30 at the 41st National Meeting of the American Institute of Chemical Engineers.

Protection of space vehicles from thermal damage during re-entry into the atmosphere at 12 to 20 times the speed of sound is one of the most difficult of problems, said Irving J. Gruntfest and Lawrence H. Shenker, of the Aeroscience, Laboratory, General Electric Company, Philadelphia, in a paper, "Thermal Protection for Re-Entry." Their paper described laboratory tests of several hundred kinds of metal, ceramic and plastic materials for use in space vehicles.

Plastics Tested

Among the plastics tested were phenolic-glass, phenolic-refrasil and phenolic-nylon. Tests also were made on graphite, silicon carbide, silica, alumina, mullite, zirconia, and copper.

It was pointed out that some reinforced organic plastics which are unstable above 600-675 degrees Fahrenheit, "have outstanding durability when exposed to gases over 12,000°F."

A satellite, re-entering the atmosphere from a 300-mile orbit would have a speed of 25,000 feet per second, a temperature of 15,440 degrees Fahrenheit and a pressure of 9.45 atmospheres, they said.

Their tests showed that "there is no one high temperature problem. Test results in specific environments must be carefully applied in reference to each mission, and chemistry must be an important design consideration."

"In most design work," they reported, "a material is selected for strength, density, electrical or other physical properties. In contrast, the usefulness of plastics for parts exposed to high temperature gas depends in many cases on the fact that the plastics can decompose slowly and superficially with the absorption of considerable heat. In addition, large volumes of gas can be generated which interfere with the convection transfer of heat to the surface.

"This decomposition is a chemical process. Its rate and course depends on the nature of the atoms of which the material is composed, on the manner in which they are bonded to one another in the plastic and on other conditions existing during the decomposition."

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C-7707 DESIGNER Grad. or equiv. age 35-45; 5+ yrs. exper. in high speed automatic machine design, know plastic materials. Duties: To design eqpt. to perform heat sealing, thermo-forming & plastic on paper applications to automatic machine design for a mfr. of paper products sal. abt. $10,000 loc. Chgo. (possible transfer to west coast later) employer will pay the fee.

C-7709 SALES ENGR. exper. in sales and/or application, service, operation of heavy eqpt. for unit processes in chem., metallurgical & non-metallic industries sal. open dep. on exper. Hdqr. Chgo. travel Midwestern states.

C-7710 (A) DESIGNERS Grad.Mech. 3+ yrs. exper. in design of compressors, to work in high pressure pneumatics div. of company designing pressurized compressors & ground support eqpt. for military & missile applications. Exper. in testing & design of components for industrial processing applications. Must be U.S. citizen sal. $7200/9600 (B) DRAFTSMEN on above sal. to $6000 loc. Chgo. employer will pay the fees.

C-7711 SALES ENGR. BSME or EE age to 32; 5 yrs. exper. selling capital goods or instruments to process industries. Duties: To contact all types of industries selling instruments, sal. abt. $650+ mo. exceptional fringe benefits, loc. Chgo. Area.

C-7712-A PROJECT ENGR. Grad.EE-Electronics age 30-40; 5+ yrs. exper. in instrumentation & electronic eqpt. as applied to chem., paper & plastics field. Duties: At project level to design & develop electronic eqpt. will contact & consult with mfrs. of packaging mach'y & eqpt., to evaluate performance of new plastic films on eqpt. Should have good personality travel 15% for a mfr. of plastic film sal. to $10,000 loc. Chgo. employer will pay the fee.

C-7712-B MACHINE DESIGNER Grad. ME age 30-40; 5+ yrs. exper. in machine design as concerned with high speed semi-automatic eqpt., printing & packaging mach'y etc. Must be U.S. citizen sal. $9,000 loc. Chgo., employer will pay the fee.

C-7717 SALES ENGR. COMBUSTION 5+ yrs. exper. in indust. sales, know combustion gaseous fuels as well as oil. Duties: Sales Engr. contacting chem. plants, steel plants & all indust. users of combustion eqpt. Must have ability to engr. & design special combustion problems as encountered in the field, travel No.Ill., No.Ind. car req'd. sal. $8/12,000 employer will negotiate the fee.

ENGINEERS AVAILABLE

1002-MW: SOILS ENGR. GEOL. ENGR. AS,BS,MS: 29—1 yr. exper. in highway soils engrg. in construction, field & lab; 1 yr. exper. in geological engrg-mining; 1 yr. in petroleum geology & editing of tech. publications; 2 yrs. exper. in aerial photography & interpretation of same. Approx. ¼ of exper. in supv. capacity. Excellent record of ability. South or Midwest.

1001-MW: DIRECTOR OF R & D BSME 36; 10 yrs. in R & D Engrg. or Project Engr., Chief Res. Engr. & Asst. VP of R & D in domestic furnaces, hoists & vending machine components. Have established R & D office. Worked with sales & customers. South or West pref.

1000-MW: CIVIL ENGR. BSCE 29; 2 yrs. officer, corps of engrs; 9 mos. EIT program, major oil company; 1 yr. project engr., design, estimating, prep. of specs. & contracts, eqpt. & material section for process units; 1 yr. construction engr. Graduate work in concrete design. Midwest.

999-MW: CIVIL ENGR. BS Ind.Engr. 51; Reg. Engr. 12 yrs. engrg. mgmt., plus 16 yrs. engrg. investigations, economic analyses, project planning, construction planning & construction: flood control, navigation, multiple-purpose projects. Particularly versed in site selection, master planning, construction & operation & maint. of air fields.

996-MW: OPERATION AND/OR MAINT. SUPT. BSEE REG. 50; 20 yrs. elect. & industrial exper. in operation, maint. & construction of substation & rotating eqpt. 7 yrs. system planning & board study exper. South or West.

Hardest Customer: Own Salesman

In the marketing of a new product the most difficult customer is the company's own salesmen.

If they aren't enthusiastic about the product the chances of marketing it successfully are slim.

"Once a product is ready for marketing, does Sales say to Development 'Thank You,' and then rush out to sell the product?"

"Certainly not," Frederick A. Soderberg, vice president, F. C. Huycks & Sons, Rensselaer, N.Y., told a new product symposium at the 41st National Meeting of the American Institute of Chemical Engineers in St. Paul, Minn. on Sept. 29.

"The transition period between these two departments is an exceedingly delicate and critical one. . . . Those who have had experience in the marketing of a new product know that the most difficult customer in the world is the company's own salesmen. If development is to end in a blaze of glory with sales picking up the torch and running full speed, then be sure that development has a well prepared, logical story to tell with plenty of facts to back it up. Unless the field men are enthusiastically supporting the entire program the chances of success are rather slim."

Mr. Soderberg advised holding a general sales meeting to launch a new product, with specialists in all phases of development explaining the product's properties. Advertising and publicity also are important, as are division meetings with marketing executives pinpointing the most important markets.

"This cooperative effort at the divisional level makes possible the selection of those areas where the product will have the widest acceptance. Success breeds success, a fact which points up the desirability of starting any sales drive under the most favorable conditions. You may think that good news travels slowly but please remember that the salesman can be convinced only when he has customers that are pleased with the product."

Warns Against "Numbers Game"

Soviet Premier Khrushchev's boast that Russia is graduating three times as many engineers as the United States should not panic the nation into a renewal of the "numbers game" which was one of the unfortunate repercussions of the earlier Soviet achievement in launching Sputnik I, according to Harold A. Mosher, president of the 50,000-member National Society of Professional Engineers.

The Soviet visitor, in his talk to the National Press Club in Washington, said Russia will graduate approximately 106,000 engineers in 1959. Later, Vyacheslav P. Yelyutin, Soviet Minister of Higher Education, who was a member of the party accompanying Premier Khrushchev, said the annual number of engineering graduates will be raised to 120,000 "in the immediate future." During the next seven years, Yelyutin said Russia will graduate 2,300,000 engineers.

"The near-hysteria of emphasis on numbers of engineering graduates which followed Sputnik I could easily be renewed if we are not careful in our appraisal of the Soviet statement," Mosher warned. "It would be a disservice to our defense efforts to play up numbers at the sacrifice of the much more important emphasis on quality," the professional society leader added. Mosher said that all who studied the engineering personnel situation carefully are agreed that the primary needs are at the poles of the engineering force—advanced knowledge acquired through graduate study and engineering and scientific technicians to back up and support the professional force by relieving them on the less creative and routine aspects of their work.

"We have made good progress in placing our emphasis on the two areas of real need," Mosher said, "and it would be tragic if we let a few well-publicized numbers throw us off this track and back into a race to see which nation can graduate the most engineering 'bodies.' One quality engineer may get us to the moon faster than a hundred quantity engineers."

In taking a position against a new "numbers" race, Mosher said it would be equally disastrous to underrate the quality of Russia's engineers. "Our concern should be primarily in surpassing them on a quality basis," he said, "rather than having our progress sidetracked into a quantity competition which can frustrate and delay the excellent work of our universities in making our graduates equal of any."

End of the Line

The Navy is abandoning its long-time love, sisal rope. It now stocks nylon mooring lines for submarines and expects to make them available for destroyers soon, says *Product Engineering*. Private boat operators, already using nylon, are now eying Dacron and polypropylene.

Hoover Dam

Although millions of Americans have already toured giant Hoover Dam on the Colorado River, it will not be completed until sometime after 1961, reports *Power*. Construction will start that year on the dam's 17th, last, and largest generator. It will raise station capacity to 1,344,800 kilowatts on completion.

WSE Applications

In accordance with Article 1, Section 5 of the By-Laws of the Western Society of Engineers, there is published below a list of applicants for admission received since the last issue of the Midwest Engineer *magazine.*

Fred R. Bruce, Executive Secretary, Western Society of Engineers.

William G. Whitney, Director-Prod. Dev., American Hospital Supply Corp., 2020 Ridge Ave., Evanston, Ill.

Armen G. Avedisian, Vice President & Dir., The American Asphalt Paving Co., 9701 S. Torrence Ave.

John W. Jessup, Dept. Chief-Struct. Des. & Fire Prot'n. Eng., Western Electric Co., Inc., Hawthorne Station.

Carl B. Avery, Supervisor-Mgmt. Serv., Ernst & Ernst, 231 S. LaSalle St.

Oliver I. Hoff, Design Engineer-Res'h., U. S. Industries, Inc., 6499 W. 65th St.

Paul K. Krause, Project Leader, A. J. Boynton & Co., 111 N. Wabash Ave.

Ayoub Y. Talhami, Assist. Lab. Tech., Armour Research Foundation, 10 W. 35th St.

Robert R. Gavin, Field Engr., American Institute of Steel Construction, Inc., 53 W. Jackson Blvd.

Frank E. Vigerske, Engineer, Western Electric Co., Inc., Hawthorne Station.

William K. McGrath, Assist. District Engr., American Bridge Division, U. S. Steel Corp., 208 S. LaSalle St.

Frank A. Marston Heads ASCE

Frank A. Marston, Boston civil engineer, heads the list of new officers elected for the year 1959-60 by the American Society of Civil Engineers. Mr. Marston becomes the 91st president of the 107-year-old engineering society.

A partner in the Boston engineering firm of Metcalf & Eddy for 37 years, Mr. Marston is a former vice president of the Society and also served as a director. New officers were installed at the annual meeting of ASCE in Washington, D.C., October 19-23, at which time Mr. Marston succeeded the 1959 president, Francis S. Friel, of Philadelphia.

Other new officers elected by mail ballot of the 43,000-member society were:

Charles B. Molineaux, of New York City, vice president for Zone I, which embraces the northeastern region of the United States, a portion of Canada, South and Central America.

Lawrence A. Elsener, of San Francisco, vice president for Zone IV, which encompasses the west coast section of North America and Hawaii.

Elmer K. Timby, of Princeton, N.J., director for District 1, which includes the New York metropolitan area, most of New Jersey and areas in New York State.

Samuel S. Baxter, of Philadelphia, director for District 4, which is composed of the state of Delaware and parts of Pennsylvania.

Thomas M. Niles, MWSE, of Oak Park, Ill., director for District 8, made up largely by the state of Illinois.

Trent R. Dames, of Los Angeles, director for District 11, composed of California, Hawaii, Arizona, Utah and Nevada.

Woodrow W. Baker, of Oklahoma City, director for District 14, which includes Oklahoma and parts of Missouri, Arkansas and Mississippi.

Bernhard Dornblatt, of New Orleans, director for District 15, composed of Texas, New Mexico, Mexico and Louisiana.

Street Cars 'Demise' Protects Gas System

Demise of the street car is helping protect the New Orleans gas system from corrosion, it was reported there recently at the South East and South Central District Meeting of the American Institute of Electrical Engineers.

S. E. Trouard and E. A. Wagner, Jr., of the New Orleans Public Service, Inc., told a symposium on cathodic protection in Atlanta, Ga. that old rails from the street car systems are buried deep in the ground beneath the gas lines to form anodes that prevent the coated steel gas pipes from corroding.

The rails are utilized in shallow beds, if the terrain permits, otherwise they are buried, end up, in deep holes, they said.

Advantages of deep ground beds were reported as:

—Full rectifier capacity is available for protection of structure to be cathodically protected. No current need be drained from foreign lines because of direct pickup effect. This means elimination of distributed drainage system for foreign lines, with consequent savings.

—Lower power costs because of drastically reduced ground bed to earth resistance.

—Smaller space required for deep ground bed.

—Deep ground bed can be installed at any convenient location. No right of way problems are involved.

—Cost of cathodic protection coordination tests is practically eliminated since current pickup on foreign lines is negligible.

—No time lost in surveys to find suitable locations for conventional shallow ground beds.

Calender of Engineering Events

Nov. 11, Wed., WSE Noon Luncheon Meeting at WSE Hq., 12:00 noon. "Railroading in the Atomic Age." Speaker, Douglas Campbell, V.P., New York R.R.

Nov. 13, Fri., ASCE Luncheon at Chi. Eng. Club, 12:00 noon. "Erection of a Record Size Plate Girder over the Northwest Expressway." Speaker, Edward L. Reiter, Ch. Eng. Div. of Subwys. and Suprhiwys., City of Chicago.

Nov. 16, Mon., WSE Young Engineers Forum, WSE Hq.

Nov. 20, Fri., ASCE Luncheon, 12:00 noon, Chi. Eng. Club. "An Engineer's Approach to South America." Speaker, Kenneth Hill, Greeley and Hansen.

Nov. 24, Tues., WSE General Meeting, WSE Hq.

Dec. 2, Wed., WSE Noon Luncheon, 12:00 noon, WSE Hq.

Dec. 7, Mon., WSE Young Engineers Forum, WSE Hq.

Dec. 9, Wed., WSE Noon Luncheon, 12:00 noon, WSE Hq.

Dec. 16, Wed., WSE Noon Luncheon, 12:00 noon, WSE Hq.

Dec. 17, Thurs., WSE Ladies Night with a Gay Ninties theme, WSE Hq.

Computers to Make Mail Obsolete?

It would seem so, in some instance, at least, according to a paper presented at the Fall General Meeting of the American Institute of Electrical Engineers.

A three or four-day mail journey of a report that took 45 days to prepare by hand would not seem an unnecessary delay. When the same material is prepared in one day on automatic data processing devices, the time it takes to be carried by mail seems disproportionate, William F. Leubbert, of the U.S. Army Signal Research & Development Laboratory, Fort Monmouth N.J., pointed out in a paper, "Data Processing as a Tool for Generalizing Communications systems," on Oct. 15, in Chicago.

"Experience to date shows that the introduction of data processing equipment is often accompanied by an explosive increase in communications requirements," he said.

"In part this is due to the voracious appetite of data processors for current, up-to-date information in applications which take advantage of their abilities to process vast amounts of information economically. In part it is because their tremendous speed of processing compared to the speed of human processors dramatically changes time factors in an overall data handling cycle.

"For example, if a certain report requires 45 days to prepare using non-automated techniques, a delay of three or four days in transmission of the raw data to prepare it because the data is sent by mail is hardly noticed. However, if a data processor requires only one day to prepare the report from the raw data, this same three or four day delay in the mail becomes the overwhelming factor determining overall report preparation time, and an obvious bottleneck.

"Obviously, if the report is an important one, badly needed for effective planning, there is a strong tendency to demand better communications service to eliminate the bottleneck. Hence, considerable amounts of data once transferred by mail are frequently added to the electrical communications requirements."

New Lampposts

New York City plans to replace its 120,000 lampposts with a five-purpose fixture, reveals *Engineering News-Record*. The new lampposts, now in the design stage, will provide street lighting, traffic signals, police telephones, fire alarm boxes and street signs in a single installation.

Tradition Broken too, At Ground Breaking

Technological advancements changed groundbreaking traditions at Illinois Institute of Technology's Armour Research Foundation on September 28, when a small explosive charge was used to break ground for the Foundation's mechanical engineering research building.

One of Armour's research divisions which will be housed in the $1,200,000 structure will be its propulsion and fluids unit, so Armour executives thought it was only fitting to switch from the traditional shovel method of groundbreaking to an explosive charge, a field in which Armour scientists have done much research.

Throwing the five switches which set off the charge were Dr. John T. Rettaliata, president of WSE and IIT; Dr. Haldon A. Leedy, director and executive vice president of the Foundation; James D. Cunningham, MWSE, chairman of the board of trustees of both IIT and the Foundation; Dr. Nicholas Weil, director of Armour's mechanical engineering research division; and Dr. T. Paul Torda, director of Armour's propulsion and fluids research division.

The new structure will be two floors high with a basement, air conditioned, brick and concrete matching the styling of other recent IIT buildings, and will contain 60,000 square feet of floor space. Architects are Schmidt, Garden and Erickson. The Perini Corporation is the general contractor.

The site on which the new building will be constructed formerly was occupied by Keith elementary school. Keith was opened in 1885 and closed this past January.

Facilities at Neosho Mine Described

Development in the United States of a system of underground facilities for industrial operations, providing also, living accommodations for employees and their families not only would be a major protection against fallout in event of nuclear attack but the existence of such a system might even deter an enemy from such an attack.

Urging such a program in mined out areas and estimating the Government's initial cost as relatively small, Russell W. Hunt, president of the Southwest Lime Company, described on Sept. 24 his company's achievement along these lines at its Neosho, Missouri, mine.

Mr. Hunt addressed a joint meeting of the Industrial Minerals and Coal Divisions of the Society of Mining Engineers of AIME. On Sept. 24 in Bedford Springs, Pa. The Society is a constituent part of the American Institute of Mining, Metallurgical, and Petroleum Engineers and is the professional organization for engineers and geologists in the minerals industries.

Mr. Hunt and his company have cooperated extensively with the Defense Department in many of its investigations into the possibilities and actual constructions of the nature advocated in Mr. Hunt's paper.

Two-year Job

A two-year job of reconstruction at Neosho was completed in January, 1958, covering an area of 600,000 square feet. The company believes that it could make 7,000,000 square feet available for similar use. The work was planned with the purpose of enabling the employees and their families, as well as most of the community, to move in if there were an emergency. Neosho's population is approximately 6,000. With the encouragement of the State Department, several foreign officials have visited the Neosho mine and, Mr. Hunt reported, "without exception, they have expressed themselves as favorably impressed. Furthermore, in their opinion, such underground facilities could have a deterrent effect on enemy attack and help prolong peace to some degree."

Mr. Hunt has been active in interesting other mining companies in making available mining areas as strategic storage centers.

"A new era is opening for the mining engineer. Buildings being used for factories and various business establishments will be placed in mined out areas and the problems of air conditioning, heating and maintenance will be greatly revolutionized," Mr. Hunt said. "In Sweden, more than 50 such structures already have been mined out and made ready. Many of them are in use now by different business operations. The mining engineer will be able to direct the mining and/or excavation in solid rock to leave a skeleton structure fit for the use of a specified commercial operation."

Drift Mining

The Neosho activities of the Southwest Lime Co. involve drift mining high calcium limestone in the Keokukledge of the Mississippian system. There is a virtually even natural floor. The ceiling varies from 22 to 27 feet. Dense stone cover varies in thickness from 40 to 100 feet. Mr. Hunt noted that in a desirable limestone mine a good dense ceiling lends itself to carrying the load of lighting and sprinkler systems and that "drift mines are most desirable because of the expense and delay involved in elevating goods from shaft mines."

Humidity control was installed at Neosho. Rooms, or areas, in the recently developed structure are 55,000 to 75,000 square feet. Because of these small sections lower insurance rates have been obtained. Eight-inch reinforced concrete division walls are equipped with approved doors. Each area has exhaust fans for bad air or gas in event of fire. A reservoir and a deep well water supply have been provided. "Be sure your facility is protected from high water flooding either by natural drainage or ample pumping facilities, with standby power in case of public utility failure," warned Mr. Hunt.

As to humidity control, a normal underground temperature of about 60 degrees provides an all-year facility which always will be in demand, whether from governmental or commercial standpoints, he advised. In his company's mine, Mr. Hunt reported, there are underground railroad docks with unloading at floor level and room for fifteen boxcars at a time. Walls and ceilings are white, to give maximum lighting and to improve appearance. "We have tried in every way to make the entire structure pleasing to the eye as well as practical," Mr. Hunt explained.

Serious Consideration

He said further:

"Forward looking companies will give serious consideration to underground locations which can give them a maximum of protection for their productive plant, plus assurance to employees of a planned shelter program for themselves and their families. No industry changes location today without trying to consider the health, welfare, and even recreational facilities available for their employees and their families. An added consideration could be adequate, convenient shelter from thermonuclear warfare with protected storage of food and necessities.

"One of the most expensive and time consuming things needed in advance to meet the threats that might materialize in the 60's and early 70's is a great deal

of underground space. It cannot be bought at the last moment."

Commenting on investigations in which Southwest Lime Co. has cooperated with the Defense Department, Mr. Hunt said, "Our preliminary investigations have indicated that with a small subsidy of the mining industry, particularly but by no means exclusively limestone mining, it would be possible to have suitable underground space created very cheaply."

Subsidy?

Mr. Hunt suggested that the subsidy paid might be the additional cost per square foot of underground mining over open quarry. He said further:

"As part of the research and development program we have urged that the government study various ways that this mine space may be used. However, our preliminary work has already indicated that the space will be useful in many ways. Therefore, we think it advisable that the government go into a mine program in at least a small way. Our personal belief is that when the time comes for the mine operator to sell this space to the government, he will find that there will be other purchasers who will be willing to pay much more for the space, and the program might end up costing the government nothing directly. In any event, the maximum probable cost involved in starting the program is small and it is important to get a feel, as soon as possible, to see how successful a large program might be. Our own estimate is that we might easily get in the early period 100 to 400 million square feet and in later periods more."

Lazy Susan

A steel company has borrowed the principle of the "lazy-susan" serving dish in building a series of vacuum-sealed steel ingot molds, *Factory* states. The molds are mounted in a vacuum-drum enclosed turntable, which rotates each mold in turn beneath a 30-ton ladle to receive its charge of steel.

Pipeline News

Sugar cane is being moved from field to factory in pipelines by a Hawaiian sugar company, reveals *Food Engineering*. Chopped in small pieces, cane is pumped in water through the pipe.

New Bronze Casting Uses Seen

Hundreds of new industrial and consumer uses for bronze castings, leading to safer, stronger and longer-lasting products, are foreseen as the result of new research data compiled at the Battelle Memorial Institute, Columbus, Ohio.

This was announced on March 26 by the Brass & Bronze Ingot Institute, Chicago, which has sponsored at Battelle a long-range program of continuing research into mechanical and physical properties of copper-base casting alloys.

The Brass & Bronze Ingot Institute said that new authoritative data on 16 mechanical and physical properties of three standard copper-base alloys—known as: 80-10-10; 85-5-5-5; and 88-6-2-4 (Navy M)—have been produced at Battelle. Included are many data known previously only by historic record, and some never before available.

These more authoritative data, the Institute states, point toward new applications for bronze castings, applications which previously were not indicated by available data based on historic record.

This means, the Institute said, that the traditional qualities of cast bronze—superior resistance to corrosion and weathering; high structural strength and durability; architectural beauty; and dimensional stability, all combined in a non-magnetic metal—can now be utilized in hundreds of diverse products to provide safer, more convenient, longer-lasting and more economical products for industry and home.

Expensive!

Keeping homes and offices bug and rodent-free is an expensive proposition in the United States, reports *"Chemical Week."* There are 5,000 exterminating companies in the country that split $150 million in business a year.

MIDWEST ENGINEER

Advertisers' Index

*Companies marked with an asterisk (*) appeared in a previous issue.

Obituaries

Dr. Arthur Bessey Smith, Honorary Member of the Western Society of Engineers, research engineer, inventor and long time pioneer in communications, died recently at the age of 84.

Arthur Bessey Smith

Dr. Smith was an alumnus of the University of Nebraska, from which he received a B.S. in E.E. degree in 1901. During the early years of his career, he worked for various telephone companies in Nebraska, Iowa, and New York state. From 1905-1909 he taught telephone engineering at Purdue University. He received the Purdue University Electrical Engineering degree in 1907.

Joining Automatic Electric in 1909 as assistant to the sales manager, Dr. Smith was soon transferred to the research department and devoted his professional career to research and development. He was granted 31 patents by the U.S. Patent office in such fields of telephony as sub-station circuits and apparatus, transmitters, receivers, toll dialing, voice frequency repeaters, trunking systems, and special services. He was the inventor of the booster telephone circuit.

Dr. Smith established the Automatic Electric Training School in 1912, serving as its director while continuing his research and development activities. He received the degree of Doctor of Philosophy in Physics from Northwestern University in 1926, based on his investigation of the phenomena underlying the slow acting relay. Dr. Smith was the author of many works, articles, and technical papers on automatic telephony, telephone switching, transmission, and allied topics, and was co-author with W. Lee Campbell of the book *Automatic Telephony*.

In 1934, Dr. Smith was elected a vice president of Automatic Electric Laboratories, Inc. in which capacity he served until his retirement in 1955. He received the Talbot G. Martin Award in 1943 and the honorary degree of Doctor of Engineering by the University of Nebraska in 1950, both in recognition of his many contributions to the field of communications.

Dr. Smith was a Fellow and Life Member of the American Institute of Electrical Engineers, a Fellow in the American Association for Advancement of Science, Member of the American Physical Society, Member of the Institute of Radio Engineers, Member of the Independent Pioneer Telephone Association, and a Life Member of the Telephone Pioneers of America. He became a member of the Western Society of Engineers in 1920, and was made an Honorary Member in 1949.

He is survived by a son, Howard H., a daughter, Mrs. Norman Lumley, three grandsons and two great-grandsons. His wife, Cora E. Smith, died in January of this year at the age of 83.

Photography Called Ideal Tool

Qualities of photography that make it an ideal tool for scientific information recording were described Sept. 24 by Fred C. Eisen of Kodak Research Laboratories at a meeting of the Instrument Society of America in Chicago, Ill.

The basic characteristics that make the process so valuable are its high sensitivity, versatility, simplicity, reliability, and large information capacity, Eisen said.

Photography is one of the most sensitive recorders of radiant energy known, Eisen pointed out. In addition, it has a range of spectral sensitivity from very high in the infrared down to the wavelength of the highest energy cosmic rays, a range of exposure times from less than 1/10,000,000th of a second to several days, and a variety of physical and mechanical properties such as size, shape, and support material, he said.

Researchers can also vary the density difference produced by a specified exposure difference to suit a particular application, Eisen noted.

Photographic recording methods are relatively simple because the recording medium — sensitized paper, film, or glass — has little weight, can be placed in a very small space, and requires no direct attachments for the actual recording operation, Eisen explained.

"The use of film to obtain further information about outer space, the interior of the earth, the depths of the oceans, and many laboratory devices can be considered simple, relative to alternative methods," Eisen stated.

In his talk, the scientist outlined methods for determining the best film for a particular application. He defined terminology used to describe photographic properties such as characteristic curves, exposure index values, and spectral sensitivity curves.

Eisen also described new Kodak sensitized materials for use in photographic instruments, such as high speed color film for missile tracking and special films for cathode-ray tube recording.

Dear WSE Members

Western Society of Engineers is 90 years old and the older it grows the more respect it commands. Why? Because it is a body of men with superior skills dedicated to the advancement of: the theory and practice of engineering, the interests of the engineering profession, the technical and liberal education of the members, the interests of the community and the country.

To translate these ideals into accomplishments we need to be strong in unity and in number. Let us then take the bull by the horns, in this 90th year, and see to it that all engineers in the Chicago area whose ideals are similar to those upon which the Western Society of Engineers was founded, are united.

The progress will be made if all of us will give larger thoughts to our pleasant duties.

Membership Committee

"What can you buy for a penny today?"

MORAL: If your electric bill seems high, it's not because electricity is expensive, but because electricity makes living so much better... you're using much, much more of it (actually four times as much as you did a few years ago).

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16 CUPS *only* 1¢

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AND
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